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ABSTRACT

The relationship between the Hawaii university system and business and industry in the economic development of Maui is discussed in proceedings of a 1985 symposium. The development of island economies is addressed by Sam Cole, while the role of a land-grant university in economic development is discussed by John Cantlon. A panel on economic outlook, activities, and needs for Maui covers: the perspective of an agricultural entrepreneur (William Monahan), requirements of the pineapple industry (L. Douglas MacCluer), recruiting personnel in tourism (Tom Mailhiot), the needs of the general business community (Lynn Britton), and the challenge of future business (Wayne Hedani). The economic development partnership panel covers: the university and economic development (Kent M. Keith); Maui's economic development needs (Donald G. Malcolm), university research and academic program capabilities (Albert Simone), community college capability and plans (Alma Cooper), and coordination of high technology development (William M. Bass, Jr.). The role of universities/community colleges in economic development is also considered, with attention to: a community college/research park case example (Stanley Spanbauer), a land-grant university approach to developing a research and technology (R&T) park (John Schade), views of federal agencies contracting in Hawaii and Maui (David Carter), opportunities for agricultural research and development (N. C. Brady), international economic development (Seiji Naya), views of venture capital firms (Brian St. John), and a community college perspective (Rudy Melone). The perspective of the business community concerning academic and research needs is also covered: views of a research park developer (Joel Smolen), views of potential R&T enterprises (Michael Dowe), views of current Maui businesses (Arden Henderson), views of current Maui researchers (Ben Bohlool), and views of an economist (David Ramsour). Discussion group reports consider defining a role for Maui in international economic development, R&T, and technology transfer activities (Patrick J. Takahashi, James Worley); as well as the potential, feasibility and approach to developing at Maui: (1) U.S. Department of Defense R&T capability (Fujio Matsuda, Jamie Chapman); (2) an international center for agricultural research, training, and technological transfer (William Monahan, Chauncey Ching); and (3) strong private sector R&T capability (John Decker, David Yount). (SW)

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# Maui's Economic Future

Proceedings of a Symposium/Workshop Exploring

## The Business/Academic Partnership

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## Foreword

This is a report of a Symposium/Workshop planned jointly by the University of Hawaii and the Maui Economic Development Board to explore the nature and formulation of an ***Academic/Business Partnership*** directed to the enhancement of Maui's economic future. This is an especially pertinent topic as Maui nears development of a Research & Technology Park which will join existing advanced projects in tropical agriculture, laser ranging, solar observation, and satellite research on Haleakala.

Contained herein are analyses and suggestions of academic and administrative elements of the University, the business and research interests on Maui, and the experiences of other mainland universities and community colleges in establishing academic/business partnerships to enhance community economic development in todays rapidly changing technological world.

The reports of the several discussion groups contain pertinent action-oriented recommendations that will serve as a blueprint for concerted action.

Albert J. Simone

President,
University of Hawaii

Donald G. Malcolm

President, Maui Economic
Development Board Inc.

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## SYMPOSIUM/WORKSHOP OBJECTIVES AND APPROACH

**Donald G. Malcolm**
**President, Maui Economic Development Board, Inc.**

The University of Hawaii and the Community of Maui both greatly appreciate your taking the time to come to Maui and participate in this Symposium/Workshop! You will serve as a sort of large computer brain to help us sort out a very complex topic. The Symposium is patterned after a most useful meeting held here at Kapalua in December of 1981 directed to exploring ways and means of enhancing Maui's Economic Future. Since it is a full day shorter in duration than that symposium you may occasionally hear this meeting referred to as the "Mini-Kapalua" Symposium. Do not be misled—this meeting will be equally intense, we are having a night session in keeping with the traditions of scholarly dedication and diligence ***and*** we are counting on the increased efficiency of communications made possible with such an erudite group of participants.

As far as we can determine this gathering is a first of its kind in Hawaii in which a business community and a University have sat down in a learning and planning environment to discuss ways to form a partnership to beneficially enhance the future. We have speakers and participants from a wide range of backgrounds and institutions—representing universities, community colleges, research and development organizations, the federal and state government and other sponsors of research, R&T executives, developers and venture capitalists to mention a few. We welcome you all and are certain that we all will have a significant learning experience in the next day and one-half.

A word on the background and events leading up to today's symposium is in order. Its genesis occurred in October of last year when some of us in MEDB met with Al Simone to go over our hopes and plans to enhance Maui's Economic Future and to explore how we could encourage the University to have increased educational and research commitments in support of MEDB's efforts. We expressed our concerns that the University research and higher education opportunities available to Maui needed strengthening in order to be able to attract new business and technology to the Research and Technology Park nearing development in Kihei. To shorten this story, after a very thorough discussion Dr. Simone suggested that a committee of three U of H and three MEDB members be formed to plan a meeting which would explore and recommend approaches to the development of an Academic/Business Partnership directed to enhancing Maui's Economic Future. It was felt that such a meeting might also serve as a model for other U of H/Community interactions.

So, in January a Committee composed of Paul Yuen, Glenn Miyataki and Alma Cooper of the U of H System and Ken Kato, Art Henderson, Jim Worley , John Decker and myself from MEDB met to define and plan a Symposium/Workshop that would focus on developing action recommendations for making Maui's Academic/Business community more relevant, cohesive and competitive in today's increasingly technologically based society. The committee felt the meeting should

be in the form of a learning session since both parties have much to learn from other communities and their institutions faced with similar problems of adaptation, survival and growth. We felt innovative solutions and approaches would be required and that we should explore some definitive opportunities appearing possible in Maui's future. Hence, the Workshop Topics for discussion in the program. We have picked four to explore.

The principal purpose of the Symposium is to discuss and make recommendations concerning how we can mutually go about developing an Academic/Business Partnership for pursuing the enhancement of Maui's economy. We will come to see what the anatomy and responsibilities of such a partnership are during this meeting. The principal focus will be on only a portion of the total spectrum implied by the term "Academic/Business Partnership"—specifically the symposium will focus on the interrelationships of the higher education and research elements and programs of the University System with the attempts underway here on Maui to strengthen and diversify our enonomic base in order to provide more challenging and rewarding jobs for our young citizens. Simply stated—What does it take from business and the University System to make Maui competitive and successful in today's technologically based society? How do we go about it? Which comes first—University or Business actions? What are they?

Thus, we have somewhat of a dilemma to resolve. For on the one hand there are both Maui and Statewide programs whose objective is to attract new business—technological and/or knowledge based—to our shores. To be successful in realizing this objective a strong, flexible, helpful and relevant University is needed—if indeed not ***required***. Business would like to see the University take the lead in anticipating and developing academic and research activities which would then be useful in its employment and problem solving needs and perhaps provide the seeds for practical new business opportunites.

And, on the other hand, the University because of resource limitations finds it easier to respond, or react to proven needs and demands. The University has historically been dependent on relatively inaccurate expressions of plans and needs of its business community and on student enrollment projections to define, develop and defend its use of state resources—essentially a *"reactive"* process in nature.

Therefore one question we shall be faced with in our meeting is - Should the University take a more "proactive" role in regard to economic development? Others have described this situation more succinctly in the form of two statements:

- Which comes first—the chicken or the egg? and from the old song,
- "Love and Marriage" — You can't have one without the other!

While the first statement has never been satisfactorily resolved, it does appear that effective ways can be found to improve the quality and the health of both the Chicken and the Egg via essentially independent activities. In regard to Love and Marriage, while there have been recent trends (or perhaps they have just been passing fancies) in the mores of our society, I would much prefer that we assume, in our discussions here, that this is both a true and desirable statement as we work

toward articulating a Business/Academic Partnership. We really can't have one without the other!

The challenge to education and business is a great one! We are different in many ways from the communities in other states. We are, for example:

- Part of an "island state"—where communications and transportation are costly.
- The State itself is composed of several islands.
- Maui County is a county composed of three populated islands.
- A state with only one major University—thus having less competitive benchmarks.
- A state with an integrated University and Community College system.
- The newest State in the Union—with only 25 years behind us.
- Dependent on few basic industries—agriculture and tourism.
- A place not generally known for its interest and speedy actions in attracting new business.

However, we are not as different from other communities as one might think. Most communities have faced similar problems at some time in their history. For example, most communities have faced up to the need to develop mechanisms for continually attracting new businesses to their environs. This has called for innovative approaches in getting land available for building sites, for reducing the time to obtain permits, developing aggressive programs to market their community, working closely with their community colleges and universities in solving the problems of business and in developing cooperative programs and partnerships that utilize the research capabilities as the seed corn for new business. We have much to learn from the approaches others have taken and how they are solving problems in coping with the challenges of working with technology-based companies. There is no reason why we cannot also be innovative in solving our problems once we have set objectives.

In our program today we shall cover:

- Where Maui is today and its needs relative to higher education and research support.
- What the principal ingredients of a partnership are. What others are doing.
- The emerging roles of universities and community colleges in helping economic development.
- A look at the heritage of Land Grant colleges and universities and what it means in today's economy.
- How others look at us—Federal agencies contracting in Hawaii, an R & T Park developer, economists, R & D executives and our own business leaders.

These will be short, to-the-point intensive talks covering a wide range of viewpoints and experiences. The speakers will be pointing up their remarks in the form of suggestions to consider in formulating a partnership on Maui. These short talks by our speakers will provide the grist for the four discussion groups on the topics

shown in your program.

This evening we shall then put you to work—using our speakers and session chairs as resource people. Utilizing the ideas and information given during the day we will ask you to examine some selected targets of opportunity for Maui and the role the University System could play in making that future happen. The discussion groups will be partially structured in order to narrow the many facets of the complex subjects involved and obtain your best thinking and advice on the steps most useful to take. You will also have the opportunity to bring up other suggestions for discussion. Tomorrow we shall conclude with reports from each of the Discussion Groups and some overall observation from the University and MEDB.

We are hopeful that this august group, its memory armed with information, spurred by imaginative discussion, and judgment weighed by what is practical—will provide ACTION-ORIENTED recommendations for an innovative and practical partnership.

## WELCOME

**Mayor Hannibal Tavares**
**County of Maui**

It's a real pleasure to be at the second symposium/workshop of the Maui Economic Development Board and to welcome you.

We have come a long way and are on the threshold of a lot of great things that are going to happen here in Maui County in the area of research and technology. We are moving right ahead with our R&T Park. The County has had a number of sessions in developing our R&T ordinance. I think it's at the stage now where I feel confident that the council will handle it. Councilmember Velma Santos has been doing quite a job in this effort. She's a real supporter. My office is working very closely with Velma's committee.

Our interest in R&T goes back to when I was first elected mayor and my concern was that we were leaning so heavily on sugar and pine and on the visitor industry. The visitor industry has become number one—and, of course, it is the number one on Maui as well as in the state.

But I began to worry a little because I felt if anything happened to sugar—and, as you know, sugar is having some problems—we would have a deeply injured economy. I'm still optimistic about sugar and I think something will come out of a farm bill. Pineapple is having trouble throughout the state with the exception of Maui Pine which is doing very well. I think their success is largely the result of superior management and the use of good technology and a good plant. Maui Pine will continue to be a very successful operation.

Nevertheless, I became concerned when I saw sugar having problems and pineapple, other than Maui Pine, having problems. I thought that, by golly, we'd better start looking for some other alternatives. Although we've got a three-legged stool, a four-legged stool is a lot more stable, especially for someone like me. So we started looking for that fourth leg.

The approach taken was to form a committee and bring in some of the best people we had in the community to look for economic alternatives for the County. I asked Colin Cameron to serve as chairman. I said, "Colin, I really want you to handle this committee because I think you're the guy that can pull it together. Let's sit and talk together and decide what kind of people you'd like on the committee." Colin said, "Yes," and you know he is a person that really gets into things. He took the assignment very seriously.

The end result of their work and recommendations was the formation of the Maui Economic Development Board that is now so effective. So here we are today, moving right ahead and coming to grips with a part of the problem. I keep on saying to the Board—I'm a member of the Board, too—I say we've got to beat Oahu; we've got to beat the Big Island; we've got to be first with the best.

Some people have posed the question: Where do you think the customers for the R&T Park will come from?

I reply: If you come up with an attractive R&T Park, and that park is on Maui, anyone who's looking at Silicon Valley or Arizona or Texas, when he sees Maui, it's going to be Maui he is going to choose because Maui is the best place in the world.

We've established that fact, I think, and they're going to come here. As a result, we are going to be very, very selective. The approach mapped out in Colin's committee was that they wanted to be sure that the selection would be very careful, that the businesses or industries that come here will enhance our lives, enhance our community and not detract from our environment. Written into the R&T ordinance are all the proper words that make that very clear to anyone who is thinking about coming here.

MEDB was very fortunate in getting an outstanding developer who's raring to go, Mr. Joel Smolen. We are very happy that he's come in here and is hanging in there with us. We are going through all the labor pains together. I think we can give birth in less than nine months.

So, while we are moving forward with the R&T Park I'm very happy to see this seminar on "The Business/Academic Parnership in the Economic Development of Maui." It is clear that business and academic interests must go hand in hand to make things successful.

As you know, we do not have a four-year university in Maui County but through our community college that is well managed by Alma Cooper and is very progressive we're putting in all kinds of communications capability. This will bring our leading universities, including the University of Hawaii, to our doorstep in more ways than one. Even though the buildings are not on Maui, the knowledge they contain is at our fingertips as a result of the kind of communications systems that we are developing. I feel very confident that anyone who comes to Maui and needs a close relationship with the academic world will not have that much trouble, because we can reach out to anywhere in the nation—or the world, for that matter—to bring this information right to our television screens.

This workshop is very vital to us in helping define our needs and approaches to achieving them. As Mayor of the County of Maui, I want to welcome you here today. I know that what will come out of this workshop will be another addition to the advancement that we are hoping to make in Maui's future.

So thank you very much for participating. Aloha!

# FROM FANTASY INTO REALITY: ASSUMPTIONS AND CONSIDERATIONS FOR THE DEVELOPMENT OF ISLAND ECONOMIES

**Dr. Sam Cole**
**Executive Committee, World Futures Studies Federation**
**State University of New York**

## A World of Islands

First let me express my appreciation at being invited by the organisers to contribute to your Symposium on the further economic development of Maui. I must say I consider it a great honor, and also of great interest because I believe the subject of "island development" is one of the great challenges of our time. If asked to say in one sentence what is meant by "development," I believe the best definition would be that development is "turning fantasy into reality." But when I come to Maui, the fantasy appears to have already come true. Obviously my definition is incomplete, otherwise there would be no seminar. To define what is meant by development is a very difficult task, but I hope that by the end of my presentation some clarification has emerged.

Suprisingly, it is equally difficult to say precisely what is meant by an "island". A territory surrounded by water? What about Australia; are we talking about small population, small geography, small economy, or homogeneity in respect to these? In the expanding literature on the economics, sociology and culture of islands, there are wide divergences in the definitions, but also broad areas of agreement, including the difficulty of definition! Typically islands are characterized by the narrowness of their resource and skill base, their dependence on outside capital and strategic support, the size and ethnic diversity of their populations, the extent of external economic control and political manipulation, and the ubiquitousness of internal political, social and internal linkages. Events, whether good or bad, tend to be more extreme. All islands are unique, but the extent to which they share these characteristics come from their small size, isolation and similar histories.

Despite the popular image of the "island paradise", much of the literature on island development is gloomy seeing them as "small, poor and remote". A United Nations report of a decade ago on developing island countries concluded that even the question of what is meant by the "viability" of small islands was not properly understood and that "further examination of the question should not proceed on the assumption that, of necessity, small islands are not viable." This is terribly important because one reads of development plans whose objective is to train islanders for the international job market, explicitly that they might migrate. In an article on Hawaii, I read that the 1977 State Plan made the recommendation to "strongly encourage outmigration now while Hawaii's population of young adults and recent arrivals is still relatively mobile." Such a policy is especially hard,

because another characteristic that islanders seem to share is a strong bond with their island heritage.

Obviously Maui is a small island by almost any definition: the problem here arises only from the question of from what other territories can we learn something useful about Maui's best approach to development. In what examples do we find the most relevant assumptions and considerations? The answer must be that there is something to be learned from all levels. But, after having worked both on the problems of small islands as well as in city planning and international development, I am convinced of something quite fundamental. Setting aside the unneccessary pessimism, I believe that there is at least as much to be learned for large states from the literature on small islands as the reverse. The reason is that if we look at any large country, say the United States there are many subdivisions. Many people will be familiar with the book *The Nine Nations of North America*, but this hardly touches the complexity. If we look at practically any community of fifty thousand or so, we find it to be made up of several population groups with identifiably different cultures, that the economy is dominated by very few sectors, and so on. In other words, we live in a world of islands. The same assumptions and considerations that we use to explore island development are needed for localized development within a bigger state. At best, problems are ameliorated through a continental location. This may sound too glib, but I want now to proceed with a couple of examples and also to take up the question of new technologies in development, which is such an important component of this symposium.

**"Islands" Large and Small**

From 1981 to 1983 I was in charge of the preparation of a medium and long term development plan for the Island Government of Aruba in the Caribbean. More recently I have become involved in the preparation of an economic development plan for Western New York, the area in which Buffalo is situated. Aruba has a population size similar to that of Maui, the population of western New York is about three million. Both populations are ethnically diverse; both areas have had their key industry collapse recently. In Aruba the Exxon oil refinery has just closed: in western New York the massive Bethlehem Steel Corporation shut down two years ago. In both cases these events were forseeable. In Aruba, action was frustrated by competition and rivalries within and between internal and external political structures. Given that for both areas the consequences were also foreseeably traumatic, it is obvious that much more thinking should have taken place several years ago. From both cases we see the imperative to think about development both widely and deeply. By this I mean first, that one has to be aware of possible changes in the world economy and how they might affect the local situation, and second, that the detailed way in which particular changes, whether mandated from outside or inside the territory, will affect different sub-groups among the population, different regions within the territory, and so on. I understand that this meeting is prompted, in part, by the possible decline of the sugar and pineapple industries in Maui. Thus it is evident that Maui has recognized a potential problem, and may through this meeting begin to find an acceptable solution.

One problem that small islands share is a lack of expertise in *all* the necessary

dimensions. On the other hand, it is only the islands themselves that can *feel* the connections. One advantage of having a university involved with the development of an island, as in Maui, is that it can provide much of the wider expertise. I do not want to be specific about Maui here, despite having read the many excellent documents sent to me by the organizers. This is because my experience in Aruba taught me that what actually happens and how programs can be carried out depends on *very* specific attributes of a society, on personalities, on historical experiences, and on the precise organisation of internal and external links, as well as on the economic endowments and other characteristics of the economy. What has to be recognised also is that while "global" economic development objectives such as employment, balance of payments, economic growth and distribution are prevalent, any particular action to affect these variables will impact population groups differently. A particular style of development may not suit particular ways of life, cultural norms and so on. In Aruba, for example, there are people of indigenous Caribbean Indian descent, as well as African and European and latterly Asian origin. Every island in the Caribbean likes to think of itself as unique in terms of its population mix and rightly so. Not only do the populations from which these groups originate have their own social customs, including attitudes to "economic" issues such as work and property, but in the manner of their subsequent socialization has modified and blurred the orignial distinctions. I imagine the same is true in Maui. Even in a country such as the United States where a strongly "assimilationist" model of cultural integration is employed, there are more than symbolic differences across population groups. The importance of this diversity becomes apparent when we consider how best to foster and make use of new technologies in an island development strategy.

It is perhaps not surprising that in the present international economic recession and faltering recovery, most countries, cities and small islands in the world are looking to "new technology" for their economic salvation. One common way of setting about this modeled on the "Silicon Landscapes" of California, Europe and Japan, is through the academic-business partnership. One can point to many countries, not least my own, where universities have been prolific in their inventiveness but have traditionally lacked the competence (and the will) for innovation. The partnership may be one way of overcoming this barrier. The University at Buffalo has also entered into such a partnership, although I believe that the arrangement could learn much from your own activities in Maui. In particular, it is evident that a very rapid learning process has taken place since your seminar in 1981 on Maui's Economic Future. Most important, there is the realization that it makes little sense simply to talk of "new technology" or "high technology" any more than it does to speak only of "development". A subtle refining of the concept is taking place as the titles of the other papers in this symposium indicate, to define what is meant by the concept in terms of local possibilities and needs. I will return to this topic at the end of my paper.

Maui's thinking on how to set up a successful partnership is, in some respects, further ahead than Buffalo's, partly because you began the process earlier, and maybe because you already recognize yourselves as an "island". Buffalo began the process later and although some of the bridge-building has started there are many matters to be resolved. Some people are questioning whether a university has a

legitimate place in the exercise since the purpose of universities is to educate and pursue knowledge for its own sake rather than to become an adjunct to primarily pecuniary or chauvanistic motives. Other people are concerned about specific parts of the programme, in particular, research that has direct military applications. These are very difficult issues to avoid, especially when, as is the case in the United States, much "regional planning" at the federal level is done through defense contracts and much of the recently found economic growth in comes from defense spending and its Keynesian stimulation of the economy, and universities are underfunded. These are clearly questions which Maui has addressed and certainly State University of New York(*SUNY )* Buffalo must be able to learn from your deliberations. In any free society there is bound to be a debate between government, industry and universities in these matters. We should recognize that such debate and the tensions it sometimes arouses is at the very heart of democracy.

There are always different notions of what consititutes "fantasy" or "reality". University faculty are sometimes accused of living in the total fantasy of "ivory towers" while businessmen are equally seen to take only a cynical view of reality. Both views are simplistic since it is evident that most entrepreneurs see themeslves as being in the business of "turning fantasy into reality" while many university faculty believe that they are able to take a wider and more considered view of "reality". This can be a valuable symbiosis from the point of view of economic development. Although the academic-business partnership is concerned primarily with transforming academic scientific and engineering research into a profitable economic enterprise, there are many other ways in which universities can help to make this exercise successful in the long as well as the short run. One obvious example is for university economists to help evaluate the overall contribution of new projects to the island's economy, and to add to this by looking also for additional projects which can create new interlinkages within the economy. Similarly biologists and others can help to ensure that new projects do not affect the sensitive ecology of the Island. In the past such activities have been viewed as troublesome by some developers but this can no longer be the case since anyone who cares for the long term future of Maui must cherish this also.

**New Technology and the World of Islands**

I now want to turn to the wider issues of new technology, in order to provide a global context for my closing remarks about the island specific possibilities for innovation. First, with so many countries, cities and regions now planning to move into "new technology," there is nothing short of a "devil take the hindmost" race in progress across the world economy. To some extent this is an act of faith since the local, national and worldwide impacts of this new technology are far from understood.

The technology that has raised both the greatest hopes and the greatest concerns is information technology, portending for some people a new industrial revolution, and massive unemployment for others. Trade unions concerned for jobs emphasize the job displacing potential of industrial robots and the like; entrepreneurs see both new products and increased competitiveness leading to new markets. Information technology has several important qualities; it increases productivity, it leads to new

products and it speeds up the transmission of data, including "market signals" around the world. Thus it accelerates the tendencies for the world of islands to become more integrated in its markets as well as in its technology.

The economic theory with which we are all familiar tells us that improved productivity and more efficient markets should lead to worldwide gains in economic well-being. The problem is that changes are taking place so rapidly that some of the assumptions underlying these common economic wisdoms may not apply. Schumpeter described the process of rapid technological, social and economic change as "creative destruction". Creative because innovation leads to new centers of economic growth; destructive because the process of structural change is very uneven and leads to capital being prematurely discarded and people becoming unemployed. Because information technology makes the transfer and control of production and technology easier, the speed with which industries open up and close down moves faster. In this situation, one region's export gain can become its competitors' lossses, both in terms of jobs and the income needed to pay for imports. Mutual "gains from trade" go by the board. For a while, at least, a spiral of "destructive creation" can be set up. Given their tendency to extreme responses, small islands such as Maui may gain greatly or lose disasterously in this global restructuring.

In the long run most people seem to believe that the new industrial revolution will lead to a better life for every one, but as with the first industrial revolution the problem still seems to be "getting there." If we believe that information technology is bringing the world closer to the image of the perfect market, then new technology should be thought of as such. In this context, the last thing the *world* economy needs is more labor- displacing technology: economic theory shows clearly that the absolute imperative for improved technology (to increase living standards) comes only when all available labor is used up. With such massive unemployment globally this condition is obviously not fulfilled. Surely history cries out for more sensible coordination across the world of islands. Maui, as a small island, can do little to change this wider context: The United States, on the other hand can do a great deal.

**Innovation and Culture**

How a small island might navigate in this turbulent sea is the foremost question for this symposium. As with other business-academic partnerships, Maui's strategy depends on the creation and sale of new technologies (as much as on their use), in order to gain from the monopoly rent (such as royalties) which successful appropriation of innovations brings. What factors does Maui have in her favor given that the escalating costs of research and development makes innovation expensive for a small island, and rapidly shortening product cycles makes appropriation technology increasingly difficult?

As the members of the Maui task force have recognized, their chosen development strategy means Maui's comparative advantages in the area of new technology innovation have now to be defined. The comparative advantages of natural endowments and location as well as the touristic combination of sun, sand and sea, are still important, but much more of Maui's potential is now bound up in the

Island's people.

This brings us back to the question of culture and the fact that Maui, like every other island, has a unique set of understanding and skills which have evolved from the cross fertilization of indigenous and immigrant cultures. The point about innovation is that by definition it is the application of new knowledge, and "knowledge" is a manifestation of culture. One of the most common practices of colonial societies was to deliberately undermine conquered and indigenous peoples confidence in their own knowledge and their ability to innovate. In the information revolution, with a yet more rapidly integrating world system, what is to be counted as useful knowledge is defined increasingly in terms of the internationalized standards of the dominant culture. Consequently "knowledge" has come to be defined principally in terms of a rather narrow cultural spectrum.

But innovation can also come from the application of old knowledge in a new way. We have only to think of the endeavors by international drug companies to unravel the mysteries of certain well-proven "traditional" medicines, the unique solutions of Polynesian islanders to seamanship, the contributions of Asian and African science and art to European culture and so on to see the importance of preserving and making use of the existing pool of knowledge. It may well be the case that contemporary society is destroying sources of innovation more rapidly than it is creating them. Although modern science and technolgoy have achieved many important breakthroughs there are many activities, not yet even recognized, let alone understood, which can provide the stimulus for the innovationsof the future. Agronomists have recognized the importance of the "gene pool"; the fostering of a "culture pool" may be just as important. Especially, in the unique cross-fertilization of cultures of island societies may lie a tremendous potential for innovation. The problem is to avoid being seduced by the idea that there is only one touchstone against which to measure knowledge. Otherwise the island throws away the very attribute which gives her a comparative advantage in innovation.

All this may sound very sentimental, but look now at the enormous success of the Japanese who have almost overtaken the United States in the innovation game. Thirty years ago the Japanese were viewed by Europeans and Americans as mere imitators. Fortunately they did not believe that of themselves, even though Japan, like several other countries has *deliberately* blocked innovation in the past. The reasons for Japan's present success at innovation are not yet fully understood, but several studies have pointed to the importance of specific cultural variables. For example it has been suggested that the manner of transfer of technical knowledge (via ideograms as opposed to blindly taking over the Occidental equivalent) means that the concepts are taken over in a way which allows them to be integrated into, rather than onto, the Japanese culture. Once integrated they become the stimulus for new and unique innovation. Or again, one explanation why Japanese firms successfully innovated automated assembly operations before their American counterparts arises from the way their respective societies are organized. The divisive departmentalization of American firms helps to prevent competitors from acquiring knowhow about new processess (from highly mobile workers) but also makes it very difficult to carry out the essential integration of the design, engineering and assembly operations. By contrast, in Japan, with a tradition of

loyalty between firms and employees, the latter can become familiar with all operations. Other attributes such as a long history of resource consciousness and delicacy in Japanese design may have contributed to the minaturization in Japanese products. If correct these explanations show that very specific cultural variables have facilitated innovation and appropriation of new technology.

Through these examples, we see how a linking of modern science and traditional know-how, in the context of an appreciation of the specific diverse cultures within island societies, provides an opportunity for islands to capitalize on their inheritance. In this may lie the possibliity for harmonious development, sustained economic well-being, and the preservation of the fantasy of Maui's unique island paradise.

Now, let me end with one little vignette. At my University we had a seminar on the meaning of development, and each of the panelists was asked to say in three words what we meant by "development." My response was that development is turning *fantasy into reality*. You have a fantasy in Maui. One comes here. One sees that fantasy. A few years ago economists saw the conflict between the idea of the tropical paradise and economic development. I don't believe we have to live with that contrast. I think people now see possibilities for island development, and how fantasy can indeed be maintained as a reality within an island like Maui.

## CURRENT ECONOMIC OUTLOOK, ACTIVITIES AND NEEDS FOR MAUI IN THE PARTNERSHIP

**Colin Cameron, Panel Chairman**
**Chairman, Maui Economic Development Board**

The role of our panel is "Current Economic Outlook Activities and Needs For Maui", in this business and academic partnership.

The thought we are examining in the Panel is : Yes, we are very much concerned with the future, with diversification, which as you know, I have been involved in - but we feel that it is also extremely important to help preserve, support, strengthen and enhance the businesses that exist on Maui now.

Dr. Cole mentioned the potential problem when a single large industry comes in— it is fine when it's here, and a disaster when it goes. In regards to Maui's future diversification, we are not looking at a single large industry, but rather a series of smaller firms; some of which probably will be locally generated, some of which will have to bring various kinds of technology from other parts of the world and settle here.

In addition, one of the great strengths of Maui is the people that are in business here now, the small businesses that are diversified businesses and would like to do more to get as much support and have as good a relationship with the University as possible. That is what this Panel will describe and discuss.

I am very grateful to Dr. Simone and everyone from the University for coming here. It is a great compliment to Maui, that they have selected Maui as a place where they felt a useful meeting, a useful exchange of views could take place between the University and the community, and particularly the business community, to address such questions as: How can we help each other? How can we improve the product the University is providing? What can they do ? What would we like them to do? I would like to urge the audience here to come up with your own ideas during the workshops.

We have the University's ears now. The people that will be making the decisions for the University are here. It's important that we make our concerns, our thoughts and our ideas known. The University has helped a great deal in the past and is currently being of assistance —there's no denying that. We are just saying: What can we do to make it better?

I would like to add one other thought before turning to our panel members. The first Kapalua conference held in this same location in 1981 was reasonably successful. The reasons that it was successful were twofold. One, we had good people there. We have good people today. Secondly, we aimed it very strongly towards action. We said, "We don't want to just have a nice talkfest and a nice time.

We want to come out with very specific recommendations that we'll do our best to follow". And we did!

In reviewing the material that was put out, three action recommendations made were important. The first recommendation was to set up a permanent organization to look to, to help focus the search for economic diversification and future growth on Maui. It had to be something new; a business, and it should be a business and public partnership, that would be able to make deals, acquire property and talk to people. As a result we have the Maui Economic Development Board, and it does represent the diversity of both business and political community views. I believe it's been successful.

The second specific recommendation was to obtain land and get it through the permit processes of the State and County in order to attract development interest. It had to be done openly and with participation of the County and within the accepted procedures. We are doing that, and that's very far along as has been mentioned.

The third equally important recommendation was to improve the educational system available, the education product available on Maui. This must go along with diversification, with any kind of high tech movement, because of the rapid changes occurring in the world. This is what we are doing right now in this meeting and is one step in that direction. How can we work with the University to improve that product as it relates to our needs and within their capabilities?

We hope to come up with specific recommendations here that can guide us collectively in this partnership.

## VIEWS OF AN AGRICULTURAL ENTREPRENEUR

**Dr. William Monahan**
**Controlled Environment Farming**

The ideas I want to discuss with you are those of an entrepreneur in a segment of high technology, an entrepreneur in agriculture with practical day-to-day experience. I want to tell you of some of the problems that batter and buffet a new project, a different way of doing things on an island.

Everywhere I've gone in the last several years, particularly when I was in the Legislature and a member of the House Agricultural Committee, I found that there was a consensus that diversified agriculture should be encouraged in Hawaii. It was usually in the context of being "self-sufficient." Some people, in my opinion, swung too much to the extreme and failed to define what self-sufficiency is.

There is an obvious impossibility of achieving self-sufficiency in an island state like ours. Climactic conditions make it uneconomic to produce some commodities so the marketplace dictates that these will be imported. Citrus and potatoes are two examples. On the other hand, almost everything you can name has been grown successfully in Hawaii at one time or another, even exporting potatoes and citrus to California. We were more civilized than California in those days.

But market conditions have changed and our company's belief is that we should concentrate on agriculture that has been proven in Hawaii as possible both agriculturally and economically in today's marketplace.

Our study of the market shows that there has been considerable diversification in recent years. In 1979 there were 8,600 acres devoted to vegetables, melons and fruits. By 1983 that acreage had grown to 11,200. As you get into more detail, you find that the increase is in a very few commodities and not in a broad expansion in the many imported items you find in your friendly supermarket. Using lettuce as an example, the amount of poundage grown in the islands has increased as has poundage of tomatoes and cucumbers. But in no way has that increase paralleled the growth of the island population, neither residents nor visitors.

In ranking by value, flowers and nursery products, cattle, milk, vegetables and melons, and macadamia nuts have been among the top five consistently for the last several years.

Hawaii is always going to have a difficult time exporting items because of the transportation cost. We should look at our import items, however, and then determine if modern technology can be applied to produce those items at a lower net cost to Hawaii consumers.

Growth in the visitor industry seems certain. We had more than 2 million visitors on Maui last year and we are projecting 4 and 5 million in years ahead. The list of imported items used in the visitor industry should be studied for agricultural production in Hawaii. The list must be studied from an economic perspective as well as in biological or horticultural terms. Though we have increased production of some commodities, the gross amount of imported produce has grown from 150 to 157 million pounds in only three years. If figures were available for the past decade, you would see a steady increase in importation in almost all commodities.

Dealing in this marketplace is highly complex. You must be an expert in genetics, pathology, insect and disease control, nutrient application and on and on. You must know how to handle money, be knowledgeable about taxes and know transportation. And indeed it would be good to throw in a healthy dash of engineering. This suggests to me that a successful agricultural venture in Hawaii must be large enough to have its own technological staff. For the most part entrepreneurs and others in the agricultural industry in Hawaii cannot call upon that kind of internal expertise so they must call on the University for that kind of knowledge.

From a very personal perspective, I believe that the University system in Hawaii is perceived as a fairly accurate source for some facts. If you have the know-how and know somebody you can get in and get a certain fact on almost any subject. While the library facilities are not extremely convenient, they are available.

Where I feel that something is lacking is in the area of problem solving. It's one thing to get a fact. It's another to solve a problem. I would say that this is not the perception that I have gotten from my counterparts on the mainland. In California, Indiana, Ohio, Michigan or wherever, the feeling is that their University is a source to help solve problems and that indeed it is a very legitimate mission of the University to help industry, to help solve problems in the industrial realm.

There is a story of a town that started out with a horse and buggy. At the edge of town there was a turn and the horse and buggy would go down and make the sharp turn and head out into the country. As the town grew, they got their first automobiles and you can imagine that the first automobile that hit that turn skidded and it wasn't long before one of them hit the oak tree right at that turn and killed someone. They they got faster cars and the next thing you knew that oak tree had a lot of dents on it so the city fathers got concerned and got all the experts together to solve that problem. Then they came up with the solution and their solution was to expand the hospital.

Well, sometimes that's the way we've approached our problems. Without being critical of the University, we look to them to come to us and say: What is your problem? Perhaps the University could apply an interdisciplinary approach to that problem. Interdisciplinary teams at the campus level can be ready to solve agricultural problems and these teams might consist of people who would not normally be seen on a farm.

The problem may be in engineering, marketing or transportation. From the top down, there has to be injected an attitude that problem solving is not only legitimate, but that a method of evaluating the success of a group of individuals or a department is whether an industry makes a profit. If an industry doesn't make a profit, it won't be there.

Evaluations of individuals and departments in the University should be based on whether they are actually out in the community, solving problems and helping industry become successful.

I think University officials should make an attempt—and this is such an impressive effort today that I'm almost embarrassed to make this commen—should continue to attempt to be in the field and listen to little people like myself who are trying to make something happen.

In terms of resources, that's always the problem and the new administration must face that. When I say "resources reallocated," it suggests a reprioritization of the University's mission to some degree.

I think that we should take advantage of the local expertise that we have—in the farmers, in mainland talents, University talents and the business experts—and try to combine that with the University's own special type of expertise, to try and bring that knowledge to Hawaii and specifically, in this case, to Maui. There are, of course, many ways that this can be done, with the communication capabilities of the community college, mini-workshops and other activities directed toward problem solving.

## PINEAPPLE AND THE UNIVERSITY

L. Douglas MacCluer
Maui Land & Pineapple Company, Inc.

Twenty-five years ago Hawaii had eight pineapple companies; today there are two. At that time canned pineapple was still a novelty in much of the mainland United States and average consumption had climbed to almost 3.5 pounds of product per person while cling peaches were really "the King," with an annual consumption of almost 6.5 pounds per person.

Oh my what changes have taken place since then! Not only are we, the pineapple industry, down from eight canneries to two, but pineapple has ceased to be a novelty and is now a commodity. Consumption has dropped from 3.5 pounds per person to 3 pounds with approximately 54 percent of the U.S. consumption coming from foreign countries. Hawaii is no longer the pineapple king. The Philippines are now king with Dole and Del Monte having vast plantations on the island of Mindanao. Additionally, Dole andDel Monte buy or process fruit in Thailand for export throughout the United States. The reasons for the shift away from Hawaii is that these foreign countries have abundant cheap labor, normally low utility costs, low shipping costs and inexpensive land.

Throughout the sixties and into the early seventies the pineapple industry had one of the most modern research stations in the nation. The Pineapple Research Institute developed all of the then famous nematocides, including materials such as DD and DBCP, and did much basic research that has been transferred throughout the world. This was necessary primarily because we had the worst nematode population problems of any place in the world, and we had a monoculture of a crop that allowed the proliferation of the nematode species.

Well, those days are over. The shift in world production, a financial squeeze and the reduction of producer supports forced the closing of this once famous facility in 1975. Fortunately, a number of the scientists from the Pineapple Research Institute went to work for the University so all was not lost.

What has been lost is the industry's ability to do "basic" research. This is the type of work that I call "directed blue sky" work. This involves the new gene splicing techniques, the virus work and the biological controls of nematodes and other pesty critters. We, the pineapple farmers, are well equipped to handle the applied research such as how many pounds of this or that will make our crop grow better, improve quality or reduce our cost of production, but we just aren't equipped to handle the far-reaching research needs of our industry.

The area that we just can't handle ourselves is the clearance of new agricultural materials. Since pineapple now consists of such a small acreage in the United States and since it costs millions of dollars to clear a material for commercial use when a new weed killer or fungicide is found to work well on other crops as well

as pineapple, we frequently ask the University for help in doing some of the analytical work. Lately the University has helped us in tracking the pesticide breakdown products in the soil and has worked on a number of "new to pineapple" products for control of a number of maladies.

In my opinion, the next big breakthrough in the world of agriculture will be in biological research, or what we call "integrated pest management." The days of throwing on another pound of cheap insecticide such as DDT to control ant problems are over. New pesticides are, by necessity, expensive and require much testing prior to use to make sure they don't kill off the nontarget "good guys" as well as the target pests. What all of us must do is to get to know our pests better, find their weak points and control them with little or no pesticides. For this type of work, we need the University's help.

The island of Maui is a unique place. We have soils that range from acidic and low in fertility to those that are highly fertile. Our plantation ranges from six inches of rainfall per year at the Haliimaile farm to 128 inches in East Maui; from sea level to 2,470 feet in altitude, the widest range of any pineapple plantation in the world. That gives you a big range to do a lot of research. We have productive people, a great need, and a climate conducive to good meaningful research information.

The pineapple farmers have had an excellent relationship with the University and its people. Sometimes we get frustrated at the bureaucracy and slow progress in hiring new scientists for specific problem solving areas but, nevertheless, without their support our pineapple industry in Hawaii would have a tough row to hoe.

It is my opinion that we should all encourage a strong research base on Maui through projects such as NifTAL that encourage scientists to come to Maui. If the local industry supports these people through our cooperation by sharing our knowledge, facilities and land, maybe we can improve their chances for success and maybe some of their basic work will be applicable to our needs. Presently we do share land, equipment and personnel with the University for many projects, but this is expected with a land-grant college that is charged with the responsibility of serving the agricultural needs of the community.

The one major problem I do see for the University is in funding. Frequently it takes forever and a day to submit for bid, through the state process for a very important item that is critical to the timeliness of an experiment. I suggest that when you are "up to your tail in alligators" you don't ask for bids from boat operators to see who has the best price to pick you up.

Another area I see as a need for the University is in strengthening the agricultural sector's credibility in the community. Unfortunately, pesticide abuse and misuse make big headlines in the local press. No one seems to care any more that the EDB in the Honolulu water probably came from a jet fuel leak, but it was big news when it could have been from a pesticide. No one seems to care about the fact that more people go to the hospital with aspirin-related illnesses than pesticide-related causes and no one seems to care that the Drano under the sink in half of our households

is far more toxic than most pesticides. People also overlook the fact that cigarettes cause a rapid rise in lung cancer in young women.

We need a strong University that supports local agriculture and one that helps solve the potential pesticide problems before they happen. In this way we can hopefully lend credibility to an industry that has been slapped around by a press in business to sell newspapers and not necessarily facts.

Just for a minute, think of Hawaii without any pineapple or sugar. Not only would the agriculture sector take a tumble, but so would our visitor industry and other businesses. We need the University's support not only for talented graduates and community support but also as the primary research arm to ensure a stable future in Hawaii.

## PERSONNEL TRAINING IN THE VISITOR INDUSTRY

**Tom Mailhiot, Director of Personnel**
**Hyatt Regency Maui**

We employ 1,300 persons at the Hyatt which makes us one of the largest employers on the Island of Maui. One hundred and fifty of those are managers and I think if you look beyond the waterfalls and birds and the architecture you find that the people are the backbone of the organization.

We have a tremendous obligation to the local population and we tried to fulfill that through the Maui Association for Retarded Citizens (MARC) program, but it has been very frustrating trying to find qualified individuals to move into career paths within our organization. This is true of our competitors, also.

The hotel is very similar to a small city. We have 37 different departments in our hotel that form a unit to provide the services that we give our guests.

The University of Hawaii has a Travel Industry Management (TIM) program which is excellent. We have difficulty recruiting individuals coming to Maui, however. We have many outlets attempting to recruit individuals and we work with many different universities, but they aren't on Maui. This is the problem we will deal with today. We need people able to step into higher positions and contribute to their functions. The answer should not be in mainland recruiting. I think that with the obligation we have to the local population we want people to see Maui through the individuals we employ. We need people able to step into higher positions and contribute to their functions.

We are becoming highly computerized in the hotel and hospitality industry. We need innovative people who can produce software packages that directly apply to our industry. We do not find those persons locally and must go to the West Coast.

We have 19 acres of landscaping at our hotel and we have to find people who know horticulture, who are able to apply the proper pesticides and we are not finding those people on Maui either. We have a number of openings in the Kaanapali Beach area and I know that our competitors are looking in California, Texas and the State of Washington because we are not finding local individuals.

The culinary field is especially aggravating. We are looking for the full range of culinary help: sauciers, butchers, pastry chefs. They are not being produced on Maui or in the State of Hawaii. We either have to go to Europe or the mainland.

Food and beverage management is another problem. We are looking for qualified people knowledgeable in fine dining, in wines, banquets, conventions and catering services. They are not here and they are not being produced.

Recreation management is a diverse field. Some 35 different colleges graduate four-year recreation management people but we do not find them in the islands of Hawaii.

Room management, reservations, housekeeping, front office, concierge—these are all positions waiting to be filled. Even with the growth of the tourism industry, we do not find persons with the basic backgrounds needed to start them into these career paths. It starts with the TIM schools. It starts with Maui Community College which has an excellent two-year program. Running with a 97 percent occupancy as we do, training on the job is not always possible. We need people to step right into these positions and contribute. We have a corporate training program set up. We have an internship program at Maui Community College which is producing some excellent individuals.

I don't have solutions—possibly it's a four-year TIM school on Maui. That's what we would like to see but I don't know if it's possible given the present economics.

I was asked to come and give you the perspective of the tourism industry and it's very difficult. I have been in seven different mainland hotels. I have recruited for the corporation, and we have 25 different college campuses where we recruit hotel and restaurant administration majors. These colleges are predominately on the East Coast of the United States; a very few are West Coast colleges. When we recruit these, the cost is prohibitive to bring them to the islands of Hawaii. That is not what we want. We want the local look, the local flare, the aloha spirit.

The problem is that right now building for the future as well as filling current needs is very difficult, very frustrating.

## THE NEEDS OF THE GENERAL BUSINESS COMMUNITY

**B. Lynn Britton, Executive Director**
**Maui Chamber of Commerce**

The Maui Chamber of Commerce supports the Maui Economic Development Board in its efforts to enhance Maui's economic future. Three major areas must be considered in determining Maui's future needs: population, employment and current economic profile.

In the ten-year period 1974 to 1984 Maui County experienced tremendous growth in resident population, labor force, employment per capita and total personal income. By 1984 resident population reached 83,300; civilian labor force was 43,300; and civilian employment totalled 39,850 jobs. Per capita personal income more than doubled from $4,240 to $10,458 and total personal income increased from $218 million to $795 million. County population grew 70.7 percent from 1970 to 1983—the fastest increase in the state—and employment is predicted to increase another 33.7 percent by 1990—again the fastest increase in the state.

This growth is attributed in large part to the success of Maui's visitor industry. Last year Maui reached a major milestone when it exceeded 2 million visitors, almost half the total number in the state. With 75 percent of its employment directly or indirectly dependent on the visitor industry, Maui is faced with the need to find new ways to diversify its economic base and, at the same time, to continue to support tourism as its primary source of economic stability.

The secret of Maui's success in tourism will pave the way for her success in this diversification. That secret is the emphasis on quality rather than quantity and the ability of Maui's people to adjust and adapt to change.

More than half the businesses on Maui today were not here ten years ago. Last year alone saw a 30 percent increase in new business and a 10 percent failure rate for a net increase of 20 percent. This is indicative of Maui's ever changing, ever expanding business community which now totals more than 3,500 companies.

Rising to meet the needs of the visitor industry, small businesses provide the skills and services needed by the visitor and increasingly sophisticated resident population. Small firms are creating more than their share of new jobs through innovation and entrepreneurship here and across the country.

The Maui Chamber of Commerce recognizes the growth of this sector of our economy and has concentrated its efforts on the needs of the small business community. It is here that the University can play a major role. As studies show, one out of two new small businesses (less than 20 employees) fail within the first four years. In the past year attendance at our small business seminars, cosponsored with the U. S. Small Business Administration and SCORE/ACE of

Hawaii, Inc., has more than doubled. Current offerings include a wide range of financial, management and specialized formats. Much more could be done through the active involvement of the University.

This leads us to the need for a complete entrepreneurial training program, such as that offered by the Small Business Center on Oahu. The program, initially funded by the Department of Planning and Economic Development and Private Industry Council, has led to the development of successful small businesses on Oahu.

A major consideration is that income of sole proprietors in the State of Hawaii increased seven times more than that of wage and salary employees last year (27.5 percent compared to 3.8 percent). Nationwide, sole proprietorship income rose 23.4 percent; wage and salary income rose 9 percent. With sugar-related employment accounting for a minimum of 12 percent of island jobs, and the state's two major banks reporting the industry faces "the greatest threat to its existence in history," training for alternative employment is a major consideration—particularly since Maui County already has the largest number of job vacancies in the state.

What are the problems and present and future needs of Maui's resident population which we haven't addressed? We must consider the geographical aspects not only of Hawaii's location in the middle of the Pacific Ocean, 2,500 miles from the nearest city, but of the state. Hawaii is an island state made up of island counties and, in Maui's case, islands within the county. This poses a challenge to the University as well as to business and government.

In determining proper delivery of higher education to our residents, we ask that you consider the following:

1. Future growth in the state will occur in the Neighbor Islands. Physical factors alone require it.

2. Maui leads the state in economic growth.

3. Up until last year, there were no full-time or third and fourth year programs on Maui for the University. Although the business and public administration programs are offered through West Oahu College on the Maui Community College campus, the format is limited due to its accelerated nature and difficult for most students.

4. Excluding Hawaii County, students from the Neighbor Islands must incur additional financial burdens for transportation, housing, food and living expenses if they wish to pursue higher education and/or advanced studies.

5. Local residents need to be trained to assume management positions in the visitor industry. The highly successful Travel Industry Management program offered at the Manoa campus could and should

be brought to Maui. We suggest there is no island more ready or more deserving.

6. The tremendous efforts of Maui Economic Development Board to establish research and technology parks on the island will be fruitless if we do not begin today to train Maui residents for the new jobs and careers in telecommunications, computer science and technology that will be created.

7. Lastly, given the strong entrepreneurial spirit of Maui's residents and business community, the University can assist by offering educational programs in management and problem solving techniques.

There is much activity taking place here on Maui. Maui Community College has played an important role in the past and will continue to play a major role in the future. They have done a good job in training people on the island for the food industry. In order to insure a bright future, one independent of fluctuations in the national economy, increased efforts are needed now to support existing industries and to develop new innovative technologies.

Hawaii's position in the center of the fast-growing Pacific Basin does not guarantee her success or economic vitality. Working together in a business/academic partnership, we can shape the future and guarantee an ever brighter tomorrow.

## RESOURCE MATERIALS


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## THE CHALLENGE OF FUTURE BUSINESS

**Wayne Hedani, President**
**Maui Chamber of Commerce**

What is the purpose or mission of higher education? This is an important question for educators, administrators and the architects of our educational establishment. For without a clear purpose, we are like wave-tossed ships on an open sea.

Is education's mission to give people a fighting chance at survival skills? Or is it to impart knowledge as an end in itself? Is it to add value to the human resources and to increase career opportunities? Or is it to foster creativity and a love of learning? Or is it to improve the human condition? Is our goal to produce a literate, informed and thinking society? Is education a more abstract end, unto itself?

Every educator has considered this but the question is: Do we agree on a common purpose or mission for education? The mission statement from Maui Community College reads as follows:

> "To provide for its community, the entire County of Maui, the best possible quality of post-secondary education. It is the philosophy of Maui Community College that education is the key to the promotion and preservation of the democratic ideals of the American republic. The college is committed to the growth of individuals as citizens of their community, nation and world, and as enthusiastic and competent participants in their civilization and culture. It is a basic assumption of this philosophy that all citizens should have vocational and general education available to them at whatever level they desire and are able to attain. A second basic assumption is that the college should be responsive to the particular educational and cultural needs of its own community, the entire County of Maui."

That's a mouthful, and it's one hell of a challenge. If these goals are fulfilled, the sky is the limit, and we really have little to worry about.

But the question is: Have we really met our mission?

How can higher education meet the needs of the business community, produce marketable human resources and skills, produce professionalism in areas of expertise, produce the best that can be produced in all fields: the sciences, management, marketing, finance, law, statistics, human relations? Research that which hasn't been researched? Ask the questions which haven't been asked? Find answers to unanswered questions, work to solve that which hasn't been

solved, and develop our greatest minds to meet our greatest challenges. These challenges are awesome.

How does the economy of Maui fare? It fares quite well for now. Tourism is robust — almost too robust for some. Maui has enjoyed the blessings, including destination resorts such as this one at Kapalua, Maui has fared quite well.

Tourism, however, by its very nature is an illusive and transient phenomena. We are at this moment subject to the winds of foreign monetary exchange rates which are creating travel bonanzas for Americans in Europe and elsewhere. We are also witnessing the periphery of abrasion and social impact which, if left unchecked, can stop us cold in our tracks and further bring us to our knees in less than a heartbeat in time. Lest we get cocky, I have always believed that he who walks with his nose in the air will trip over rocks in the road. There are challenges to tourism fit for the stout-hearted.

Sugar, though apparently wrested from the clutches of certain unnamed corporate raiders, still sails in dire straits. Foreign competition, domestic competition and changing values have almost made pure natural sucrose an anachronism in its own time. Sugar is possibly approaching the latter stages of its product life cycle as a health-conscious nation turns to synthetic low calorie products. It is no longer "in" to be a sugar fiend and the product hasn't changed in 150 years—but the market is changing rapidly.

Pineapple, like sugar, suffers from foreign competition. Fortunately, we have maintained an edge in producing a superior quality product. This edge, however, probably cannot be maintained indefinitely. Eventually, they will learn how to keep their product from tasting like it's packed in battery acid and they will give us a run for our money.

The military is a nonentity on Maui with the exception of the facilities on Haleakala.

Diversified agriculture and manufacturing keep a small segment of our people employed with productive employment probably outstripping demand in most cases. I'm assuming, of course, that we exclude marijuana from the picture because it deserves to be excluded from the picture as well as from our lives and the lives of our children.

So given that picture, what lies in store for Maui? More tourism? Hopefully continued sugar, pineapple and diversified agriculture. And, high technology. If we are to provide for choices and diversity in the future, our course is clear. We cannot rest on past successes. This is why education is so critical. We need to focus on new directions. We need to stretch for new horizons. We need to provide an educational system capable of competing in the 21st Century.

There are companies now which turn corn into fuel for automobiles and turn by-products of heat and carbon dioxide into controlled environment farming producing 25,000 heads of lettuce a day. There are electric vehicles capable of

holding a charge sufficient to cover 250 miles of travel. There are solar cells being grown in the absolute vacuum of space and there are microchips which do on a wafer what it took hundreds of pounds of equipment to accomplish in the past.

Agriculture becomes agri-business and resource management. Orchid growing becomes hybridization, typing becomes word processing, and computers are here to stay. Educational institutions are perceived as a critical criteria in site selection decisions.

Will our people be ready? Will we be able to move to the cutting edge of various technologies? Will our young people possess the necessary foundations for success in the coming years?

Yes — if we rise to the challenge and the dawning of a new age. All citizens should have "the vocational and general education available to them, to whatever level they desire and are able to attain."

That is a good mission and a good challenge. It is my hope that we will succeed in meeting that challenge here on Maui because it is important. The gauntlet needs to be picked up and a commitment to a hopeful future needs to be addressed. If we keep our ears glued only to the railroad tracks of the past, sooner or later we'll learn about trains the hard way.

## INGREDIENTS FOR THE ECONOMIC DEVELOPMENT PARTNERSHIP

**Dr. Kenneth Kato**
**Regent, University of Hawaii**

**Dr. Kato:** Our panel will explore the needed ingredients in developing the desired academic/business partnership for Maui. These include: the State through its Dept. of Planing & Economic Development, the University through its research and educational capabilities, the Maui business community and the Maui Community College.

Dr. Cole gave me a good idea in his speech. He said he attended a conference just prior to coming here, and the panelists were asked to describe in three words "economic development". While I will not place that type of limitation on our panelists, we will confine each panelist to roughly eight to ten minutes.

# THE UNIVERSITY AND ECONOMIC DEVELOPMENT

**Kent M. Keith**
**Director of Planning and Economic Development**
**State of Hawaii**

It is a pleasure to be here today to discuss the ingredients for a successful business/academic partnership for economic development. My focus today will be on the University of Hawaii system and its relationship to economic development on a statewide basis.

## The Emerging Economic Importance of Universities

Perhaps it is just as well to go back to the beginning, to the founding of universities eight hundred years ago. The earliest universities at Bologna, Paris, Oxford, and Cambridge were gatherings of scholars and students, studying and disputing issues in the areas of theology, law and medicine. For centuries, universities in Europe were vocational education institutions, training priests, doctors, and lawyers. Even then they had economic importance as institutions which spend money. Students paid for food and lodging, faculty members rented halls and facilities, and the local economy reaped the benefits. Towns and cities grew up around universities, as they have grown up around major trading posts or manufacturing centers. Universities were, and still are, the economic mainstay of many communities throughout the world.

However, until late into the 19th Century in Europe and America there was probably little relationship between formal education and economic development. The great inventors of the 18th and 19th Centuries were practical men, experimenters, self-taught mechanics and craftsmen, who served apprenticeships with older mechanics and craftsmen and then applied their own ideas to solve problems. The Industrial Revolution of the early 19th Century did not come from the colleges and universities.

Research is an industry in and of itself, of course, regardless of whether the subject being researched has any relevance to the economy or economic development. In the 20th Century, however, scientific research began to have an impact on the economy. Discoveries of economic value were made at universities. It became commonly accepted to hire university faculty and researchers to investigate and test hypotheses and projects desired by the free enterprise system. This trend has continued and increased in importance.

However, there has been another trend, wider and deeper. Within the last two decades in the United States, knowledge itself has become a primary industry. We used to speak of agriculture, forestry, fishing and mining as primary industries. We must now add knowledge as a primary industry, because today the United States has a predominantly service economy, and the service industry is based on knowledge.

It is, for advanced countries such as ours, the foundation of economic development.

For the university, it is a heady transition from the vocational school for priests, doctors and lawyers of centuries gone by, to the key institution underlying the success of today's economy. It was not inevitable: the most important economic research in Japan is largely within the major companies, not at the universities. It is also not a total transition: there are important research labs in the private sector in the United States, with distinguished records of achievement. But an important shift has occurred.

**The Purposes of a University Today**

The emerging economic importance of universities is potentially a problem for both the universities and the body politic. It will certainly be a big problem for the universities. A resource of such great importance cannot be left alone by the community within which it exists. It will be harder for universities to be independent and cloistered, with little relevance to the economy. The larger community has too much at stake in terms of jobs, taxes and the standard of living. The body politic cannot be indifferent to the economic impact of what happens on campus.

This can create a struggle in regard to the purposes of a university. I believe that a university has at least three purposes. *First*, a university must teach. It must teach people how to think and, above all, how to learn for themselves the rest of their lives. It must assist students in learning the subjects of special interest to them, and it must help them learn how to apply those subjects so that their knowledge is a true resource for them. A university should inculcate a desire to learn, and a desire to transmit knowledge to others. As our standard of living rises, and available leisure time increases, a university education must provide the basis for the productive use and enjoyment of leisure by our citizens, through aesthetic, creative, social and cultural experiences and activities. This purpose can be fulfilled by undergraduate programs. This is the traditional role of the "college".

*Second*, a university must conduct research. It is part of the nature of human beings to be curious, and a university is a place where that curiousity must be exercised. We must conduct research because we do not know what we will find. Some of the most important discoveries of greatest benefit to society were made by accident, while seeking something else, or simply pursuing a line of inquiry. A university must inquire and examine and ponder, increasing the knowledge that is available for us to teach. This purpose can be fulfilled by graduate programs and research institutes. This is the role which transformed colleges into modern universities.

*Third*, a university must reach out to the community. It must become involved in the needs, hopes and aspirations of the community in which it is located and which supports it. A university must be an asset in solving problems, and a means of continuing education for those who desire it. Its expertise must be applied to society in a relevant manner. This purpose can be fulfilled by a variety of university programs, especially those of the community colleges. This is the role which made community colleges a necessity.

All of these functions, of course, support economic development in some way or another. Students must be educated to take up positions in business enterprises; research can lead to new products and services; and expertise can be applied to economic development opportunities directly through outreach activities. Everything the university does will in some sense be relevant to the economy, because all knowledge will relate to the economy in some way. The degree of relevance, however, can vary greatly. And it is a relevant university that is the primary ingredient in an economic development partnership between the business and academic sectors.

**The Relevance of the University of Hawaii to Economic Development**

Relevance may be difficult to measure. What do we mean by a university which is relevant to the economy and economic development? I would like to suggest two dimensions. First, a university is relevant if it teaches, researches, and outreaches in the areas which are the current focus of the local economy. Here in Hawaii, that list would include tourism, defense industries, and agriculture. Second, a university is relevant if it teaches, researches and outreaches in the areas which are the cutting edge of the future of the local economy. Here in Hawaii, that list would include natural energy, ocean industries, agriculture, various forms of high technology, and Pacific/Asian programs.

I personally believe that the University of Hawaii system is not especially relevant to economic development in our state. This is a matter of grave consequence to Hawaii's future and the general welfare of our citizens. If there is no improvement, we will miss major economic opportunities, and fail to be competitive in the world economy. Fortunately, improvements can be accomplished. I believe that the situation can be redressed without a major reorganization of the University or a major reallocation of its resources.

My first premise is that money is not the most important problem. Every institution wants more of it, and could make good use of additional sums, but the bottom line is not how much you have, but what you do with what you have. In this case, it is possible that having more money might camouflage the real problem. The real problem is priorities, and the need for focus and disipline in enforcing priorities.

**The University of Hawaii Budget**

Let's look, for a moment, at the money. The figures I have been able to obtain do not all match up, but I will do the best I can. In the current fiscal year, the State government budget for the operating costs of the University of Hawaii system totals $220 million. Of that total, $153 million or 69.5 percent is for the Manoa campus. The remaining $67.3 million is for the Hilo campus, the Community Colleges, and statewide support. Of that $67.3 million, $28.8 million is for Community Colleges on Oahu, and $13.7 million is for the Hilo campus. That leaves $4.4 million for Maui Community College and $3.5 million for Kauai Community College.

Just to give you the order of magnitude of the University of Hawaii's total budget, and its potential impact on economic development, let me give you two other

figures. In the current fiscal year, the entire State budget for all aspects of economic development is $39.7 million. That includes trade and finance, energy development, water development and irrigation services, fisheries, aquaculture, and agriculture. That total is only 18% as much as the University system is receiving from the State. My department, the Department of Planning and Economic Development, has a budget this year of approximately $9.4 million, which is only 4% of the total funds the University is receiving from the State.

In addition to the $220 million from the State, the University has been successful in attracting federal and private funds. The University's financial report for 1984 shows that current fund expenditures and mandatory transfers totaled $294 million, approximately $75 million above the amount funded by the State. Of that total, $102 million or 34.8 percent went toward instruction, 19.8 percent went for research, 16.9 percent went for plant and other operations, 16.2 percent for support activities, 6.8 percent for student services, and 5.5 percent for public service — community, cooperative extension, and non-degree instructional services. That last category, public service, was $16 million, or $7 million more than the total annual budget of the Department of Planning and Economic Development.

I am sure that there are special problems with these funds which make it difficult to manage them. The University has high fixed costs for personnel and plant, and the use of some funds is restricted as to purpose. Some areas are federally supported and others are not. And so forth. However, it is still my belief that it is not the total amount of money but the setting and enforcing of priorities for the use of that money that is the problem.

### Setting and Enforcing Priorities

Every university has special problems in setting priorities. The body politic—the larger community - has many factions and interest groups with specific desires. Every program or department has a constituency in the larger community. Try to cut or reduce a program or department, and university administrators will hear about it from the particular faction or interest group affected.

As for politics, I believe that no institution is more political than a university. The politics inside a university can be more political than the politics in government - it is, in a sense, worse politics than politics. At least in government politics, there are rules, hearings, timetables for decision-making, known participants in the decision-making process, leadership hierarchies and power blocs, and sunshine laws. Politicians are exposed to public scrutiny for their decisions. It is possible to figure out what is going on, and who did what to whom. On campus, it is far more subtle and far less public. Furthermore, decision-makers live in a collegial environment, and no one wants to tell a colleague that his or her program or department is being cut or reduced in importance, so that another program or department can be enhanced or expanded.

Finally, it seems to me that universities consist of people who are devoted to research, teaching, and outreach, but have little respect for the power and prerogatives of the university's own managers and decision-makers. It is in the

nature of the university itself. Some believe that a healthy university is characterized by an ongoing low-level chaos. It is important that there be freedom to think and act, with minimum interference by the "bureaucrats." In that context, university administrators are viewed by some faculty members as a nuisance, by others as a necessary evil, and by most, *primus inter pares*, first among equals. That may not be enough power for university administrators to put priorities into effect. Thus, in addition to the politics inside and outside the University, there is the problem of enforcing priorities once they are set.

This is the only way that I, an outsider, can explain the curious and frustrating phenomenon that I have witnessed for ten years in regard to the University of Hawaii: University administrators set the right priorities and then nothing happens. The right goals are articulated, but not implemented. The right speeches are given, but there is no follow up. The words are the right words, but there is little action.

**Targets of Selected Excellence**

The right words that I am referring to have included the "targets of selected excellence" which university leaders referred to during the past decade. As I remember them, those targets of selected excellence included the travel industry program, tropical agriculture, Asian languages, renewable energy, and ocean-related programs. These are areas of great promise for our economy, and I support them. It is disheartening, however, to see how little money is going into these areas. If more resources were placed in these areas, the relevance of the University to our economic future would be greatly enhanced.

Our major industry is the visitor industry. It accounts for one third of all our jobs and tax revenues. It accounts for a third of all the money the University itself receives from the State. It is an industry with a bright long-term future throughout the world. It is something we are good at. It is an industry in which our own people can rise in the ranks to top management posts. We can be a world center for training in the field of tourism.

Fortunately, we have a School of Travel Industry Management(TIM). Unfortunately, it is budgeted at $558,571 in the current fiscal year. That is only .5 percent—half of one percent—of the University's total budget for instruction.

Almost any crop can grow in Hawaii, and many can be harvested several times per year. We want to keep Hawaii green and beautiful, and one way to do that is to keep agriculture strong. There is no shortage of land - only 16 % of the land in our State which is zoned for agriculture is planted in crops. We need to find new crops which can be marketed successfully. We can also become an agricultural research center. One estimate is that we employ 20 times more people per acre in agricultural research than in the production of crops. Fortunately, we have a College of Tropical Agriculture and Human Resources. Unfortunately, the agriculture portion of the program is budgeted this year at $4,197,000. That is 1.9 percent of the total University budget.

Then there are foreign languages. Hawaii could become an international meeting

center, trading center, and financial center, in the new Era of the Pacific which is now emerging. We have been talking about this for decades. There are many things which will have to be done to make it a reality, including adjustments in State laws. One of our greatest assets, however, is the multicultural character of our community. Unfortunately, being multicultural is not the same as being international. We cannot be international unless we speak the languages which match our cultures. Fortunately, we have a variety of foreign language programs at the University of Hawaii. Unfortunately, the amount of money being spent in this fiscal year on foreign languages in the university system is $3,216,000. This represents only 2.9 percent of the University's total budget for instruction.

There are only a few major strategies for economic development, and one is import substitution. Our largest import now is petroleum, which costs us $1.3 billion per year, roughly 10 percent of our gross state product. We have been blessed with virtually every form of renewable energy - solar, wind, biomass, hydro, geothermal, and ocean thermal. If we can develop these resources, and substitute for imported oil, the benefits will be immense. We will no longer be sending money outside the state—it will stay here, pay our own wages, and multiply in our own economy, generating tax revenues for our own services, including the university. Although the oil crisis of 1973 was a clear signal, and the State Legislature established the Hawaii Natural Energy Institute(HNEI) at the Manoa campus in 1974, it was ten years before HNEI was given a single permanent position. Furthermore, its budget has been small, and made even smaller by reductions by the University administration. For the current fiscal year its budget is only $579,048. That is .9 percent—less than one percent—of the University's research budget.

To a great extent, the economic future of Hawaii will depend on the wise use of its ocean resources. The ocean has long been important as a source of food, a means of transportation, and a place for recreation. Today, technology is developing which will make it a source of vast amounts of energy and minerals as well. I fully expect to see, within my lifetime, the use of the ocean as a place to live. The ocean is humankind's last frontier on this planet, and the exploration is just beginning. Hawaii has a marvelous geographic location to be the jumping-off point for this exploration. We also have virtually every type of ocean condition near our own shores, for research purposes. This area is a natural for us. Fortunately, we have a Department of Oceanography and the Hawaii Institute of Geophysics. Unfortunately, for the current fiscal year, ocean sciences are receiving only $806,100 or .7 percent of the University's total instructional budget. The Hawaii Institute of Geophysics is receiving $2,591,000, which is only 4.4 percent of the University's total research budget.

We have now looked at the funding support for subject areas which are key to the present and future economy of Hawaii. The total spent on instruction and research in tourism, agriculture, foreign languages, renewable energy, and the ocean comes to $11.9 million, or 5.4 percent of the total funds which the University of Hawaii is receiving this year from the State. I believe that 5.4 percent is just too little. It is too little for the future of our economy, and certainly too little to call these areas "targets of selected excellence." Those subjects deserve better. Our economic future deserves better.

## The Strategic Plan and Higher Education Functional Plan

The concept of "targets of selected excellence" has apparently been superseded now by the University's ten-year "Strategy for Academic Quality," covering the years 1985-1995. This document, too, includes many of the right words. One of the strategic dimensions is establishing an international, especially Pacific/Asian, focus. Another is adapting to scientific and technological change. One strategic objective is to play a stronger and more focused role in assisting the State to achieve its priorities, guided by the State Higher Education Functional Plan.

The Strategic Plan is good. I support it. However, the Strategic Plan was developed within the University without input from the larger community. The Higher Education Functional Plan, on the other hand, was developed in the community, with an Advisory Committee of education officials and citizens. It was then reviewed by the State Policy Council, consisting of State and County officials and members of the public, and was finally adopted by the Hawaii State Legislature in 1984 as policy guidance for the State. Whereas the Strategic Plan addresses the University of Hawaii system, the Higher Education Functional Plan addresses all institutions of higher education in the State.

The tone and content of the two plans are different. The University's Strategic Plan emphasizes research and instruction with little mention of areas of economic significance. The Functional Plan, on the other hand, clearly demonstrates the community's desire for economic relevance. It is the Higher Education Functional Plan that urges the development of university programs in the visitor industry, agriculture, ocean and alternate energy research, astronomy, and high technology. Incidentally, it is also the Higher Education Functional Plan which calls for career counseling and the delivery of information on occupations and training opportunities in Hawaii. This Higher Education Functional Plan can serve as the starting point for the business/academic partnership for economic development.

Let me repeat my belief that the primary ingredient in an economic development partnership between our business and academic sectors is a university which is relevant to the economy of both today and tomorrow. Our economy cannot be strong unless we have a university which is teaching, researching, and reaching out in the areas of greatest economic importance to our State.

## The University and Independence

I hope it is clear why the community would like greater economic relevance. I think there are clear benefits to the University as well. First of all, if the University does in fact want to get more money, the State's economy must expand so that tax revenues will expand and more money will be available to give to the University. In order to expand the economy, we need to stimulate economic growth, and we need to do so in areas in which we are uniquely competitive. That brings us back to exactly those areas I have been discussing—tourism, tropical agriculture, foreign language programs, ocean and energy programs. If these programs are bolstered, the economy will be bolstered, and the University can be given more money to spend on these and other programs in the future.

I assume that the University would like more independence in its operations. I assume it would like less pressure or interference from the outside. Greater economic relevance could eventually give the University more independence. There is no guarantee that this will happen, but we normally delegate responsibility to those whom we believe will do a good job with little supervision. If the University does a better job of responding to the economic needs of the community, my guess is that it will be given more freedom, or experience less interference, from the community. You don't bother the people who are doing pretty much what you want to have done.

**The University and the Neighbor Islands**

Thirty years ago, at the beginning of what we call the "Democratic Revolution" in our State, our political leaders embarked on an extremely idealistic and admirable crusade to provide all the people of Hawaii with equal access to education, jobs, and the political process. Extraordinary amounts of money flowed to the less-populated Neighbor Islands for schools, hospitals, roads, and other infrastructure to guarantee equal access and quality public services. In other states, the quality of education and public services varies depending on how poor or wealthy a particular district happens to be. In Hawaii, the goal was equality for all, statewide, whether urban or rural, Oahu or Neighbor Islands.

That goal has not changed. It may be time to apply it with renewed vigor to higher education. The Hawaii State Plan calls for the expansion of our economy toward the Neighbor Islands, and the Neighbor Islands are aware of the fundamental importance of University activities to their local economies and to the opportunities of their students. It may be appropriate, and it would be beneficial to the Neighbor Islands, to concentrate and build the University's programs there. This might include moving to the Neighbor Islands some of the programs which are now concentrated in Honolulu.

Every campus has its own esprit, camaraderie, and sense of importance. The esprit, camaraderie and sense of importance at the Manoa campus may make it difficult to move people and programs elsewhere. I am also afraid that some Manoa faculty and administrators are a little condescending toward the Neighbor Islands and their more rural communities. If everyone thinks Manoa is the hub of the academic world, everyone will want to be at the hub. But the future is not there; the future is going to be spread throughout the State, and the effectiveness of the University will depend more and more on its unique capabilities, some of which will be on the Neighbor Islands. For example, the University does important work on diversified agriculture. Most of our diversified agriculture is on the Neighbor Islands. The University has a marvelous astronomy program, but the observatories are on the Big Island. The Hawaii Natural Energy Institute has many accomplishments to its credit, but there is little renewable energy activity on Oahu — most of it is on the Neighbor Islands. And so it goes.

I am sure that each program interacts with other programs, and it could be argued that splitting off a major program area would harm that area, because it would

become more isolated. However, if we accept that argument, the Neighbor Islands will never get the same quality programs and investment that Oahu in now getting. A look at the University budget reveals that they are now getting less than their percentage share of the total budget when compared with population. For example, Maui, with nine percent of the State's population, appears to be getting two percent of the State's budget for higher education. If it were proportional to population, Maui would be getting not $4.4 million per year, but $20 million per year.

And this leads me to an obvious and very important fact: the University itself is a huge industry, and the Neighbor Islands need it. The amount of State money spent by the University of Hawaii system each year is equal to the annual revenues of the entire pineapple industry. If you add in federal and private funds, the amount spent by the University of Hawaii system each year is nearly equal to the annual revenues of the entire sugar industry. Teaching and researching and outreaching are big business, as are the construction and maintenance of campus buildings and facilities. If sugar and pineapple decline, the impact will be far greater on the Neighbor Islands than on Oahu. Why not stabilize the economies of the Neighbor Islands by shifting university resources and activities there from Oahu? Oahu has less to lose from the decline of sugar and pineapple. If $100 million or one third of the University budget were to be spent on the Neighbor Islands, it would make a big difference in and of itself, not to mention the opportunities for economic growth which the University would stimulate.

**Knowledge —Theoretical and Applied**

One of the best things about the statewide University of Hawaii system is the Community Colleges. My impression is that they are well staffed, and are doing a good job of reaching out to the community. There may be a special role which they can play in the business/academic partnership, since they emphasize the application of knowledge, and not just theory.

One of the curious things which has happened to education in our country is the immense respect we are now giving to theoretical thinkers, rather than people who can actually do things. My guess is that this is a relatively recent affliction, perhaps in the last two generations. It may even be worse in European countries - at least we Americans generally like to think of ourselves as being pragmatic. Let's take an example. Think of the automobile that you drive each day. The people who understand the physics and chemistry which went into designing the car are held in high esteem, and the courses they teach are said to be for the brightest and the best. The people who are called upon to fix the car when it breaks down are not held in such high esteem, and taking courses in auto mechanics is something people supposedly do if they aren't good enough to undertake theoretical studies. This is really absurd. Both theory and application are essential, and equally deserving of praise and support. Unfortunately, it does not appear that they are getting equal support.

In any event, the Community Colleges may be closer to the practical application of knowledge than the Manoa campus is. This may put them in a frame of mind closer to that needed by the business community. Many students at Community Colleges

expect to get jobs in the fields they are studying, so their training has immediate and tangible importance to them. The professors and instructors who are training them are translators. They translate the theories into useful applications in the real world. Their desire to be relevant is enhanced by knowing that their students will walk into a business establishment immediately upon graduation, to use what they have learned. This is simply not true for most students in four-year liberal arts colleges. Most of them will have to go to a graduate school or obtain on-the-job training on their first job. I would thus like to propose that another ingredient in the business/academic partnership for economic development is greather emphasis on the Community Colleges.

**Knowledge Transfer and Product Incubation**

We have noted that knowledge is a primary industry, and that the university is today a foundation of the economy. We Americans have not been awfully good at applying the results of our research. The transfer of knowledge to useful business products and services is a challenge, and it may take special institutions and facilities to make it happen. A working committee of the High Technology Development Corporation is now looking into the possibilty of setting up a university park or incubator facility near the Manoa campus. This could be the first of a number of facilities which could be the headquarters for research institutes and laboratories for the development of prototype products. This type of university park could be the meeting ground for the business and academic interface. By being off campus, it would be a different environment, one in which the faculty member or researcher is a consultant and perhaps an entrepreneur. By being near campus, it is convenient to the faculty member or researcher, and near the broader base of expertise at the University.

Another topic to be taken up by the working committee of the High Technology Development Corporation is the patent policies of the University. At present, they seem to be a disincentive to the invention of new products or services by University faculty and researchers. The transfer of knowledge is less likely where there are few rewards and the paperwork just isn't worth the trouble. Greater incentives may be needed.

**The Business Contribution to the Partnership**

So far, I have discussed different aspects of the University — its relevance to economic opportunities in Hawaii, the needs of the Neighbor Islands, the special role of the Community College, and the need to transfer knowledge from the University to the business world. A partnership, of course, requires at least two partners, each with a distinct contribution to make to the success of the partnership. What can business do to make the partnership real?

Business, of course, can hire University professors and researchers to test products and services, do market studies, analyze materials, study trends, and the like. This makes the University's expertise available to the economy, and provides real experience for the faculty members themselves. It also can help ease the problem of University salaries.

In addition, business leaders can support specific University programs and facilities at the State Legislature. It is appropriate, in a democracy with a State-sponsored university, for the community to lobby for certain things it feels it needs. A partnership could set priorities, and support those priorities in the community and the political process. This may or may not result in more money, but it could result in money in those areas of highest mutual priority.

Finally, if the university is indeed as essential to economic development as it now appears to be, businesses should invest in it directly. One way to build up key programs of economic relevance is to attract high caliber people who will attract other high caliber people. These "magnets" may be appointed to a prestigious chair in a certain subject, a chair which might bring with it added salary and funding for laboratory and equipment costs. This is basically the approach being used in the Fellows in Renewable Energy Engineering program. Business donations are being used to bring in top experts to work in the renewable energy area. One important fact is that the University does not have much of an endowment. Those who endow can shape the University by endowing monies for purposes which they consider high priority. The business community could endow chairs in subjects which represent economic potential for the future.

## Conclusion

In conclusion, there are several steps which I believe need to be taken to develop a business/academic partnership. The University should become more relevant to the economy, and long-term economic opportunities; it should build its resources on the Neighbor Islands; enhance the Community Colleges; and establish incubator facilities and programs for the application of research results. The business community can help by hiring University professors and researchers as consultants to evaluate products and services. The business community should support university programs which are mutually agreed to be of high priority, and should assist in resource reallocation by endowing chairs or donating program monies for areas of economic promise.

None of this is easy, but all of it is possible. I believe we must do these things for the health of our economy and the happiness of our people. In so doing, I believe we will also invigorate the University and add to its long-term growth and success as an academic institution.

## MAUI'S ECONOMIC DEVELOPMENT NEEDS

**Donald G. Malcolm**
**President, Maui Economic Development Board, Inc.**

In the preceding panel we heard expressions of Maui's current economic outlook and needs. Using that as a base I shall confine my remarks to outlining what the MEDB is attempting to do in its program aimed at bringing new business opportunities to Maui and in turn what needs this would place on an Academic/ Business Partnership.

First let me make a brief review of MEDB's history and purposes. The Maui Economic Development Board, Inc. was established in April of 1982 in accordance with the recommendations of a conference/workshop similar to today's and held in this same location—the Kapalua Bay Hotel—in December 1981. That conference was dedicated to the study and recommendations concerning Maui's economic future. One of the principal conclusions and recommendations was that a not-for-profit, combination public-private organization should be set up to develop action programs directed to the enhancement of Maui's economy. MEDB is managed by a Board of Directors which include the Mayor of Maui County, the Chairman of the County Council, the President of the Maui Chamber of Commerce and members of Maui's business and professional organizations. Our meetings and minutes are all open to the public.

In the Kapalua meeting it was found that our dependency on three primary industries—sugar, pineapple and tourism —made us quite vulnerable to trends and variations in the nation's economy. Moreover the job situation was not an attractive proposition to most of our young people who were looking for challenging and rewarding jobs. Increasingly our educated young citizens are leaving the state in pursuing their careers. In the course of the meeting it was determined that by far the biggest constraint in attracting new businesses to our shores was the fact that suitable land for industry simply was not available and would take at least five years to obtain and get all the necessary permits required. Sufficient acreage to permit the establishment of a large, modern, campus-like area with building sites ready for immediate construction of attractive facilities is required in order to be competitive with mainland communities.

It was also recognized at that time that the presence of a strong, viable educational capability—one that was flexible and supportive of business—was needed. An active program of interaction with MCC was established and many supportive activities have gotten underway. But more on that later.

Based on the overriding severity of the land availability problem and the lead time involved, the number one priority program established by the MEDB Board was to obtain and make land available for the development of what came to be called a Research & Technology Park, or R & T Park. We are now about three and a half years down that five-year road I mentioned. R & T Parks are distinguished from

the more traditional industrial parks by two principal attributes. They contain essentially research or "knowledge" based businesses as contrasted to mass production, intensive manufacturing oriented industries. Secondly, R & T Parks have campus-like environments in which the structures are modern, attractive, low rise, with lots of open space and landscaping, underground utilities, off-street parking and also have a very low density in terms of the use of the land. These two attributes are given great attention by mainland communities in their efforts to attract new business.

With a site of this quality available it is possible to attract new businesses to our shores. During the past two years we have searched for and obtained a suitable site in the Kihei region of Maui for a 300-acre R & T Park. Land Use Commisssion approval for urbanizing the site has been obtained and we have signed a development agreement with a highly successful Santa Clara County developer (whom you will hear from later in this program) to develop and market the property in five- to ten-acre parcels. Determining the needs of the new companies that will come to the park and being able to state convincingly that our University and Community College are capable, supportive and flexible enough to work closely and respond quickly with new types of industry are the most important factors in attracting these companies at the outset. Early activity in defining these needs and in developing the required response mechanisms appear to be first priority items for the partnership to consider.

A second, but equally important area of concern, lies in the care and feeding and, hopefully, growth of contract research that has already been developed on Maui either through the University or directly via contracts with private-sector companies by the federal government. These are represented by the on-going work in Science City on Haleakala and the NifTAL Project of the College of Tropical Agriculture. They are perhaps not overwhelming in size or economic importance but they do represent that seed corn from which other ventures can be built. University policies and commitments that will encourage and enable these activities to grow in both size and scope would be a major step in enhancing the attractiveness of Maui to related businesses that might establish operations here. *Policies, and/or new institutions, that would encourage cooperative ventures with the private sector would be most helpful.*

Maui has an important heritage in agriculture that can serve as a springboard for advanced agricultural R & D. In cooperation with NifTAL expertise, Maui could aspire to become a strong bio-tech center and an international experimental and research station in tropical agriculture. *Would it not be worthwhile to have a stated goal to develop the necessary research facilities and programs to become an international center of excellence in this field?* And then to set about developing the federal grants, the working relationships with agri-business and the international consulting arrangements that are necessary? Maui is blessed with a wide range of climates and growing conditions, that according to some is more diverse than exists elsewhere in tropical climes. Growing conditions range from desert to rainforest climates, at elevations from sea level to 4,000 feet. This appears to be one of the most promising areas in which to develop a new approach and could well be one of the first partnerships developed.

The establishment of State and University goals and commitments in this area, wherein a deep and meaningful heritage and a wealth of related experience exist, would then go a long way towards encouraging private sector investment. *Such commitments could include the establishment of specialized new research institutions with interdisiplinary faculty assignments coupled with new incentives and encouragement for faculty research entrepreneurship.*

Maui's communications capabilities are in need of improvement and would be greatly enhanced by the development of a state-of-the-art two way video capability. Our multi-island county could be a model for joint use of such facilities in education, government and private sector activities. Our uniqueness and the need to offset our high transportation costs makes Maui an ideal laboratory in which to evaluate the use of these advanced capabilities. The University could be brought to business and the costs could be mutually shared. With such capability a goal of being a major technological transfer point for the Pacific Basin would be in reach. *New businesses which are considering a Maui location would be encouraged by the existence of such a telecommunications capability in which they could participate and utilize in some prearranged way.*

The capability to have job oriented training programs and to access University library and computing centers are also items of interest to prospective companies. Enabling policies relative to use of these capabilities could be an item that would interest companies that are in the process of making a location decision. *In short, establishing a means for the Community College and the University to make these resources available for use by a company (on some appropriately established cost recovery basis) could be quite helpful in attracting that company to locate in the state.*

In summary, the University has several areas wherein it can be of help in enhancing the economic future. If these needs can be determined, appropriately packaged and actively marketed in the state working through the established system, a major step in the Academic/Business Partnership will have been achieved.

## UNIVERSITY RESEARCH & ACADEMIC PROGRAM CAPABILITIES

**Dr. Albert Simone**
**President of the University of Hawaii**

I am very, very pleased to have the opportunity to be with you this morning. In a sense this Symposium is a little bit of a dream come true and in many ways *deja vu* for me, as I recall our strategic plan which we worked so hard to develop at the University. In my view, this conference is a positive response to our Strategic Plan and in many ways is a reflection of the Strategic Plan itself. I would like to take a moment to review this Strategic Plan in terms of its broad outlines.

The Strategic Plan for the University of Hawaii talks about the University of the future. The University of ten years from now will be seen as a university which is responsive to the State's needs. It will be a university of quality; a university which has an international dimension; a university which is responsive to science and technology; a university which is part of a total community. What we are discussing here today is really an example and an illustration of all of these objectives. We are talking about how the University can serve State's needs better; how it can be responsive to the State's needs for economic development. We are not talking about quantity. We are talking about quality.

Finally, we're talking about a university which cannot be all things to all people. That means we have to be selective and that we have to set priorities and allocate and reallocate resources according to those priorities. This was spelled out in our plan. I'm very happy that so many of our panelists have seized on that notion.

Let me now turn to the question of what the University's response is to science and technology and how we can relate that to the economic partner in the total community. It wants to have the trust and the confidence of the community.

The University can bring a number of things to bear. Two points are key and I don't know which of these is more important. First, it is obvious we can't do anything without human resources. We are in an information age. Learning and teaching are not physical things. They are not something that happen because of facilities. They are something that happens because of people. The main thing that the University can bring to the future of the State and the University is qualified, motivated people, faculty, staff and administrators which facilitate the work of the staff and the faculty. Our faculty who do the teaching, who do the research, who interact with the community are the most important resource the University can bring to the partnership.

Secondly, there's something else that must be present - attitude. In many ways attitude is at least of equal importance because it facilitates what the people do. The expression of attitude, the right kind of attitude, an attitude of quality, an attitude of caring, an attitude of responsiveness, an attitude of relevance makes beneficial change possible.

One measure of the University's current attitude and commitment is that approximately half the people in attendance here are from the University. They are from all disciplines virtually and from all campuses, including a full contingent from the Community Colleges. All of the Provosts are here, in addition to a number of their faculty.

In this regard a number of pleas were raised in the previous panel and have been raised elsewhere. Could the University do better? Some of those pleas to do better are justified. Some are a bit simplistic, to be candid. But that's why we are here, to explore these kinds of notions and see what can be done.

The largest single contingent is from Manoa because that's the single largest campus. Many of our disciplines are represented—basic arts and sciences, professional schools—as well as some of the staff that support the work of the faculty, the members of our planning department, our budget and planning group, and our grants and contract offices. This is one measure of our commitment to the topic and purpose of this meeting - namely economic development on Maui.

In the process of doing this perhaps we are forgetting about the fundamental mission of a university. Wayne Hedani described the University in terms of its values. He talked about the University in terms of its broad purpose, its comprehensive nature, not a narrow focus. He pointed out very appropriately that the main purpose of the University is teaching and research, to bring young minds into maturity, to discover new knowledge. Broadly conceived—not narrowly conceived, not for weak, narrow purposes.

One of the previous speakers mentioned a half dozen areas of excellence at the University and the relatively small percentages of the budget allocated for those areas. At the Manoa Campus location alone, one can major in a hundred different programs. You can get a Master's Degree in 60 or 70 of these. You can get a Ph.D. in 34. That's what every comprehensive university in the world offers, if it is to be a comprehensive university. As pointed out there is just one comprehensive university in the State. That's the University of Hawaii.

Our fundamental responsibility to the State is to be sure that we provide a balanced, comprehensive, quality education for all of the people in all the areas so that when they graduate they will have an appreciation and an understanding of the total world in which they live. Part of that world is the world of work. But for many people who spend a lot of hours at work it's not the most important reason for living. Everyone has his own reason for living, but it may not just be for economic advantage. At the University we have to be sure that students have that kind of a balance. I surely believe we have a university which does provide that kind of a balance.

Turning back to our fundamental mission which is teaching, research, and learning, we want to be aware of the problem-solving requirements existing in the State. We provide facts and information. We have been problem solvers but perhaps not enough. I think that the answer to that problem is communication. We've got to

bring our problem solvers together with the problems much more readily and effectively.

Wd have talked about the needs of basic research as well as quality. Everyone at the University could not agree more. We have to make sure that basic research is not ignored. Are the people that we produce with baccalaureate degrees ready to accept jobs here? Why should people educated here have to leave the island to find a job? Why should we have to bring in people from outside to fill jobs that we control? That's something to think about seriously and something that we want to work on.

The University wants to be responsive. We want to be relevant and part of that responsiveness and relevance means that where the University can it should support the goals of economic development. This is because we are a State university and it is a State need. Our funding comes from the State and the taxpayers. If we increase the tax base, we will be making it possible to provide a better and more comprehensive education. It's a closed circle.

The fundamental purpose or philosophy of the University may be restated as follows: to provide a broad-based, comprehensive education which provides general knowledge as well as specific knowlege and which is responsive to the needs that the economy might have at a particular time.

The University already has had many interfaces with the community, many of them productive. We could list some of these interface activities but it is better to ask: Can we make the interface better? How can we improve it? This forum provides us with a basis for this kind of exploration. That's why I'm so delighted that so many of us from the University are here. We'd like to know from the conference what Maui would like to have from the higher education system so we can be responsive. We've heard an awful lot today. Already so far I've got about ten pages of notes. I am greatly interested in focusing on what the University can encourage so that I can go back and talk to the people at the University with positive ideas on what we can encourage, support or suggest. We've heard some answers and we are going to get some more insights as we go along.

The comment was made earlier: Could not more higher education be distributed across the neighbor islands in some other way? In my opinion we have to be very careful here but the answer is: Yes, perhaps. We are open to that approach. If we move in that direction we must be careful not to destroy the fundamental critical mass and the fundamental core which makes a great university great, its many faculty, many disciplines from having an opportunity to share each other's respective views, and to share facilities. We also will need a central location even if multiple locations are developed.

The critical mass has another dimension. Will the population support particular moves? Where the population might not support a particular set of facilities and programmatic and personnel moves, one may say: What can you do? Must you just wait and tolerate a vacuum? The answer is: No, we look and explore what other transition approaches can be made to happen. For example, Outreach is the answer in the short run until a critical mass potential is established on many of the neighbor

islands. West Oahu's baccalaureate program is operating in Maui right now and there are 48 students in the program. It is a three-year program, providing a baccalaureate degree with majors in public administration and business administration. In '84 we finished an MBA program which graduated about 14 students which was about half of those enrolled. Another Outreach program from Manoa provides a masters degree program here in education. Since 1982, there has been a program in nursing which has led to baccalaureate degrees. We've had 17 people who graduated and there are another 12 that are enrolled at the moment.

Outreach is a key at least in the transition period before we can determine the most effective way to maintain quality education, which requires critical mass and responsiveness to the community, and which requires, perhaps, better access than now exists here for higher education.

The community colleges have an important role to play. I view the Community College on Maui as having a really pivotal role, a focal point. It's a base of operations from which we can build. Alma Cooper will be covering this so I'll not get into this area further. Already so much has been done. It's a great story which I'll leave to her.

The research activity at NifTAL involved in developing high protein foods through less reliance on artificial, commercial fertilizer is having an impact around the world. NifTAL already has a satellite operation in Bangkok and others are being planned. You will hear more on this later in the program. NifTAL is an example of what the University and Maui can do together on an international dimension.

Astronomy has also been mentioned. There are so many things that can be developed in this research realm which have spin-off opportunities for high technology and research to attract firms, provide jobs and raise the tax base. Other areas include ocean research, alternative energy, telecommunications, aquaculture, aquafarming and soils analysis. These are the kinds of things that this University in conjunction with this business community can do on Maui.

The legislature is asking us what we're doing in Hilo. Our answer has been: Well, we've got a big conference planned on Maui. After we see how that turns out maybe we can talk about establishing a beginning of a partnership in Hilo as well. The Hilo chancellor and his staff are here to see what can go on.

So let me conclude by saying we are excited to be here. We're very positive about being here. We wish that maybe we could have taken the initiative. We have done it in small ways, in little programs, but not a major initiative like this. We thank Maui for taking the initiative and giving us a chance to respond positively. We want to make it real and actual and not just rhetoric.

Maui really is leading the way for the State in terms of development of the economic climate throughout the State, particularly on neighbor islands. The University wants to respond. The University wants to be counted on. We really look forward to the results of this conference and even more important to what will follow this conference.

## CAPABILITIES AND PLANS FOR MAUI COMMUNITY COLLEGE

**Alma K. Cooper, Provost**
**Maui Community College**

Maui Community College, part of the University of Hawaii, is the only public institution of higher learning serving the people in the County of Maui. As an institution of higher education, the College values the spirit of free inquiry, independent thinking, the pursuit for truth, pluralism and diversity, open access and equity to opportunity, quality teaching and services, and community. The College's commitment is to a comprehensive curriculum dedicated to providing for the total development of the individual in the integrated studies of the humanities, social sciences, language arts, and career and job training. We envision the College as the Life Long Learning Center; the County as the Life Long Learning Society. And, while our values of serving our community are clearly demonstrated, we recognize there are limits to what we can do within our resources.

The College's involvement in the economic development of Maui County is to provide the linkages between economic development and human resources development. The College's Educational Development Plan, 1985-1991 states:

> We will provide assistance to the County's economic development via instruction, partnerships, and other cooperative endeavors with business and government. Our plan for assistance includes the provision of programs in high demand areas, fast-response, short-term approaches to meeting changing educational and training needs, contractual industry/business specific training, and utilization of our telecommunications facilities.

The College will want to participate in partnerships with business to assist new companies moving into our community in training and upgrading programs on the plant site, in other locations and on campus. The College will also want to make available, wherever possible, professional and continuing education training by special arrangements through noncredit options custom designed for groups in short-term classroom offerings and satellite transmitted programs.

One way of seeing a part of the capabilities of the College is by way of the review and evaluation report of the team representation of the Accrediting Commission for Community and Junior Colleges led by Dr. Phyllis Wiedman, President of Diablo Community College. This august body of educators made the following statements:

> PLANNING: The updated Educational Development Plan is an excellent piece of work that articulates well with the University of Hawaii plan and with the system's Chancellor's plan.

NEEDS ASSESSMENT: It's hard to imagine a College that has done more in communicating with its community to identify areas of potential services. Both credit classes and community services are offered in outreach locations primarily as a result of effective two-way communication of needs that has occurred.

INSTRUCTIONAL PROGRAMS: MCC's instructional program has been thoroughly analyzed and evaluated during the past few years and careful planning has been done to guide future development.

PRODUCTIVITY: Through careful program planning, judicious scheduling and regular review of low enrollment situations the College can expect to maintain what seems to be a satisfactory level of productivity.

COMMUNITY SERVICES: The 1982 team recommended that MCC continue to expand its outreach program especially to Molokai and Lanai. MCC's response indicates that such an effort has continued. The resulting programs are in many cases quite commendable.

OUTREACH EFFORTS: Outreach is an integral part of the MCC mission as reflected in the EDP. Especially commendable is the effort now under way to offer a greater variety of courses and services through cable television, "portacourses," and self-paced independent study.

The mission of Maui Community College is to provide quality educational services to three islands of Maui County—Maui, Molokai and Lanai—as well as to serve people on Maui who do not live within commuting distance of the campus. To carry out this mission and to achieve access to people in our county, the College and the University have made major commitments to developing the new technology systems to serve Maui County.

MCC has made a major commitment to developing telecommunications as a means of reducing the geographic isolation of Maui County and its respective island communities from general isolation of postsecondary education and professional and career development opportunities. Telecommunications will provide the means to serve our clientele's educational purposes by enriching their access to quality instruction and services. MCC has already made commendable advances in the development of its telecommunications system satellite reception for instruction and teleconferencing.

**A. Satellite Communication**

The acquisition of an earth satellite station (uplink capable) through a federal Title III grant has enabled the College to gain access to national televised courses and programs for training and instruction from various satellites. These programs can be delivered into homes and work places by way of cable television. In the future, the proposed closed circuit interactive microwave system will enable us to transmit these materials and programs into the work place.

## B. Teleconferencing

Satellite reception enables the College to hold teleconferences with national forums for Government, business and non-profit groups in the State of Hawaii. For example: The College, the County of Maui and the State Committee on Humanities and Arts cosponsored a video conference "Main Street, USA" televised from Washington, D.C. Architects, planners and business people from across the state came to Maui to participate. A few weeks ago students in a political science class teleconferenced with Senator Daniel Inouye who was in Washington, D. C.

## C. Cable Television Instruction

The College and Camp Cable Television have developed a partnership for the College's use of Channel 14. The campus studio is linked via microwave to Camp Cable Television which provides the programs free of additional charge to subscribers. Television instruction began when five courses were first offered in the fall 1984 semester. During the fall, the College was on the air 70 hours per week. The College offered two packaged telecourses supervised by instructors: one packaged course with additional "wrap around" materials prepared by the instructors and three live courses.

MCC's future telecommunication plans have these parts: first, an interactive microwave system to improve linkages between the three islands in the county; second, participation in a state-wide closed circuit educational television system; and, third, a satellite uplink which will provide two-way communication between MCC and the world.

## A. MCC's Proposed Interactive Microwave System

Maui Community College presently has a proposal before the National Telecommunications and Information Service, Department of Commerce, for federal funds to construct a multiway, interactive microwave closed-circuit link between the Maui campus and Molokai, Lanai and Hana. This system, if funded, will link the Islands with live multi-way video and audio communication and will allow the College to offer on-campus courses to small numbers of student in a remote location. Any student on any island in our county will have equal access with students on Maui.

As a community college we have a community service function, which is also addressed in our telecommunications effort. The closed-circuit microwave system would also be used by the county and state who have similar problems reaching underserved populations on Molokai and Lanai and in Hana.

Access by the public in these remote communities to state and county service programs and personnel would be improved and cost effective. Linkages with state and county governments and their respective units using

MCC services would be facilitated by shared access to this system. Remote community access to educational and cultural programs would increase, and cooperative ventures with business and industry are possible.

Partnership networking with state departments and the Mayor's Office, the County Council and the private sector—that is, Maui Electric Company—enabled the College to submit a stronger proposal to the National Telecommunications and Information Center. Mahalo!

**B. Statewide Interactive Closed-Circuit Educational Television System Linkage to MCC's ITFS System**

The statewide interactive closed-circuit educational television system in Hawaii when installed by the Hawaii Public Broadcasting Authority will electronically link all the campuses in the University of Hawaii's higher education system and will significantly improve and expand Maui County's educational, training and informational access to statewide resources at a cost savings.

Hawaii Public Broadcasting Authority's proposal for $4.5 million to construct a statewide interactive closed-circuit educational television system was approved by the 1985 legislative session. With executive allocation for this project, according to Dr. Jim Young of Hawaii Public Television, the Instructional Television Fixed System (ITFS) may be operational in the first quarter of 1987.

This statewide system will interface with MCC's microwave system thus allowing Molokai, Lanai and Hana to share the instructional resources. Training and educational programs may originate on Kauai, Oahu, Maui or Hawaii with transmission reception sites located throughout the State. The possible uses to instruction and services to residents in Maui County are many fold. Courses previously offered only on Oahu will be transmitted by the interactive microwave system to the Maui campus and the MCC microwave system will transmit to Molokai, Lanai and Hana.

**C. The Role of the College in Satellite Communications Among Pacific Institutions in Higher Education**

In the third phase of our plans, the College hopes to install an uplink component to our earth satellite transmission station to implement our interest in international relations and international education, consistent with the University's goal to play a prominent role in the Pacific and create expanded international understanding. We hope that the telecommunications system will be used by research and instructional resources in the University of Hawaii. The College's system may also be available to businesses in our community.

This telecommunications capability along with the interactive microwave closed circuit system may be used by research and instructional resources in the University of Hawaii system to transmit and receive data signals and

courses and other video uses to and from institutions outside the state within restrictions imposed by the FCC. It may also facilitate businesses on cost-recovery basis, and could facilitate interactive teleconferencing for the University, state and county governments, the community and possibly businesses.

The campus computing system with its VAX 11/750 superminicomputer, 24 microcomputers, 38 terminals and 18 printers will be expanded by a second VAX, 3 microcomputers, 8 terminals and 2 laser printers in June. Maui Community College is planning the installation of a broadband local area network at the end of summer. This will be the first non-Wang broadband local area network in the state and will be the first to accommodate data, video and voice.

The first phase of the installation will interconnect micros and terminals, enabling them to communicate regardless of the type and giving each access to either of our VAX's or any of the computers at the Manoa Campus which are used for instructional or research purposes.

**A. Administrative Computing**

Word processing, spreadsheet, data base, and electronic mail capabilities have been widely used for more than a year at MCC. Electronic mail and document transfer also occur between Maui and the Office of the Chancellor for Community Colleges. By early fall MCC will be linked to seven other Administrative VAX's throughout the University via ethernet. Currently, administrators and staff are being trained in the use of our new fiscal system which will be implemented this summer. For over a half year we have had computer assisted registration and counseling. During the coming year these tasks will become fully computerized when we implement our new student services system.

**B. Instructional Computing**

MCC is now tied to the University of Hawaii Systemwide Computing Center's new CDC Plato system, bringing a wealth of computer assisted instruction to Maui. Students not only have access to MCC's instructional VAX, but also the IBM and DEC mainframes and H/P 3000 located at Manoa. Instruction integrating data and video will enable independent learning in all areas of instruction once the broadband network is installed. A new large screen video projection system has just arrived. This instructional aid will enable large groups to view computer graphics, video tapes and video disk frames.

The information and computer science offerings and enrollments have grown from four classes and 120 students in fall 1981 to 16 classes and 215 students in fall 1984. The results of a countywide survey of businesses and educational institutions during spring 1983 indicated community computing needs. In response to these needs MCC offered two new courses this year. A course in Advanced BASIC was the first of its kind in the Hawaii Community College System. This spring a course in computer graphics,

including animation, was offered the first computer graphics course in the University of Hawaii system. Another new course will be offered at MCC this fall, Algorithms and Programming I which is a required course for the computer science degree at Manoa. The course teaches structured programming in five different languages: Pascal, BASIC, FORTRAN, COBOL and RPG. A new offering planned for spring 1986 will instruct the student in the use of electronic spreadsheets, data base systems, and word processing on microcomputers.

Our office of community services is purchasing transportable computing equipment for use at various business locations on Maui for delivery of noncredit computing courses.

The telecommunications and computer systems at MCC interfaced with the Hawaiian Public Television Authority's telecommunications system and the University of Hawaii's computer system vastly improves and expands the capability of the College to serve economic development in Maui County.

Legislators have appropriated funds to construct the statewide University of Hawaii automated library system. This system will enable Maui County residents to electronically access the entire library catalog and distribution system at MCC Hamilton Library and all other campus libraries in the UH system. The availability of this service for county residents will provide more efficient access to library materials in the University of Hawaii's system.

In other areas related to business support, the College provides noncredit business and professional training, "portacourses," career and job counseling and cooperative education. The College works with the Private Industry Council on job training partnerships to train eligible people to become employable.

The cooperative education program which prepares students with job experiences while attending school has placed 833 students in 347 businesses over the past few years. Career and job training counseling are available through the Educational Opportunity Center and the College's student services. A summary of the College's Educational Development Plan is available for general informational purposes. Anyone wishing to discuss the plans in greater detail may do so by request through the Office of the Provost. It would be an appropriate beginning for business partnerships to inquire about the College's Educational Development Plan and to offer assistance to achieve the goals of the College.

"Partnership with business/industry" for economic development brings to mind the term *kompad*. When we were little kids we used a strategy called *kompad* to offset defeat or setbacks in games we played. Parties wanting to win together would discuss/negotiate how their mutual needs might be met by sharing resources to achieve the desired outcomes. *Kompad* collaborations generally produced multiplicative rather than additive outcomes. *Kompad* communications were open and direct, creative and innovative. *Kompad* negotiations flourished through mutual respect, trust, enthusiasm and support. It is in the spirit of *kompad*

relationships that Maui Community College would like to foster joint projects for economic development in our county.

MCC has its eye out for *kompad* partners so that the college can respond to the educational needs of existing businesses and their employees, maintain our mission to our island communities, contribute to economic development. The College can achieve these goals through securing financial support, acquiring specialized equipment and facilities, dealing effectively with organizational policies, and developing strategies in partnership for meeting the requirements for sharing resources.

A little story about *kompad* or partner. *Kompad* is a Filipino expression. I can remember how the single Filipino males who resided in the bachelor quarters pooled their resources to purchase a car. There were any number of owners with everyone wanting to sit in the front seat where they could be seen. Four Filipino men squeezed into the front seat with no one in the back seat, forerunners of the compact car! Well, the point is that MCC is willing to be in the front seat with our business *kompads* in our county!



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## COORDINATION OF HIGH TECHNOLOGY DEVELOPMENT

**William M. Bass, Jr.**
**Executive Director,**
**High Technology Development Corporation**

As its 1985 session was concluding, the Twelfth Legislature adopted two resolutions, which tasked the High Technology Development Corporation(HTDC) to develop a statewide program to increase high technology activity in Hawaii. After eight months of study, the Corporation published a report entitled *"Statewide Strategy for High Technology Growth"*. That report was forwarded to the legislature by Governor Ariyoshi in December of 1984 and has since become the vehicle for coordination of the state's high technology development efforts. I would like to share with you very briefly the results of that report.

The first thing we had to do was to define high technology as it is likely to be developed in Hawaii. In the Corporation's opinion, Hawaii's high technology development program should focus on those types of activity that will be attracted by Hawaii's many unique resources or by perceived advantages stemming from its geographic location in the center of the Pacific Ocean. Starting from this premise, we believe that Hawaii's high technology niche as research, development or production lies in:

- Astronomy
- Oceanography
- Telecommunications
- Aquaculture
- Electronics design
- Software development
- Biotechnology
  - Tropical agriculture
  - Pharmaceuticals

Our strategy for encouraging growth in each of these areas has six basic elements, and as I go through each, I will try to emphasize actions we are taking that may be of interest to attendees of this symposium.

1. **Improvement of the Educational System from Kindergarten through Post Doctoral Study.**

   - At the University level, we support *The Strategic Plan 1985-1995* and are prepared to testify before the appropriate bodies for enchancement of research programs, faculty and staff incentives.

   - The HTDC and U.H. have established a working group to explore means of improving U.H./business interface.

   - Community colleges anticipate, plan and provide for training needs.
     — In our opinion, there are policies in effect at the U.H. that constrain its abilities to respond to the research needs of the private sector. This may be necessary, but we feel this policy should be examined.

— There are also directives that limit faculty and student use of university facilities to develop commercial applications of research. Again, maybe rightly so, but the working group wants to study other models for technology transfer to see if there is a more conducive system.

- After last year's governor's symposium a volunteer council on education was formed to help the Corporation identify its role in improving education. While it is still seeking to define its role, the council has shown an interest in working with the community colleges to anticipate, plan and provide for training and educational requirements that will be generated by high-tech firms moving into or expanding within their communities.

- Our country faces a crisis in the availabilty of teachers in basic science and math. At all levels in our state educational system, the Corporation seeks to encourage excellence in the teaching of science and math and has testified in favor of tax exemptions for corporate assistance in this important area.

- We also recognize that high-tech firms are first and foremost businesses and that our educational system should offer a strong solid core with emphasis on writing skills.

**2. Enhancing the Business Climate by Removing Disincentives.**

- The governor's symposium also identified disincentives to business activity that are particularly harmful to high-tech ventures. These ventures are generally capital goods intensive, and must bring into the state the majority of their equipment and materials, and export their products for use outside the state.

  — This year we worked closely with the Tax Review Commission and Legislature to remove the Use and Excise Tax on capital goods and the Excise Tax on goods sold for export.

  — These tax measures were ultimately lumped into the broad Tax Reform Bill, which died in conference committee because of philosophical differences between the House and Senate on raising the General Excise Tax and imposing a Hotel Room Tax. The committee reports on the Bills to repeal the Excise Tax on Exports and Use and Excise Taxes on capital goods are however hard evidence that these measures have legislative support. We are hopeful that they will be acted upon in the next session.

**3. Provide Access to Seed Money/Venture Capital.**

- The Corporation recognizes the shortfall in availability of Venture Capital as perhaps the weakest link in our high tech development program.

— Without it start-up companies can't develop their products and growing companies can't expand to their next level of potential.

Our efforts to date on this issue have been to educate Hawaii to the need for a source of capital and the rewards such investments can bring through:

- The Governor's Symposium.
- Seminars on Venture Capital and developing a winning business plan.
- Encouraging networking by supporting the RAP TECH sessions.
- Encouraging entrepreneurs like Brian St. John, who will speak later today, to continue to try to build a private sector fund in our state.
- Putting companies who inquire about venture capital in touch with known potential source.

**4. Develop Infrastructure/High Tech Parks.**

- We will have three high-tech parks in operation in the state as early as 1986: the R & T Park here on Maui, the proposed Mililani Town Park on Oahu and the Ocean Science and Technology Park that the HTDC is developing at Kona on the Big Island. It is assisting in these developments and finding tenants to occupy them that we believe the Corporation has its biggest role.
- So far, we have helped to resolve the dispute that threatened the Mililani Town Park by working with the community and developer to resolve questions on hazardous waste. We have also testified before the Planning Commission and County Council in support of the project.
- With regard to the Maui project, we have testified before the Land Use Commission on its behalf and are prepared to proclaim its importance to the statewide strategy before the County Council if required
- As developer of the 547 acre park at Kona we have been successful in obtaining legislative approval of the $7.85 million capital improvement project and are now engaged in the tedious land use approval process that all developers must face.
- As to filling the parks, I share information on all companies inquiring about high tech sites in Hawaii freely with the Oahu developer and with Don Malcolm of MEDB. Our concern is to bring high tech firms into Hawaii or to grow or expand local versions. Our success or failure will be measured by the degree of growth and not by its direction. I'll say more about this when I get to Marketing.

**5. Provide Innovation Centers/Incubator Facilities.**

- These facilities encourage development of fledgling high-tech firm by providing facilities at affordable rental rates, management and technical advice. Ideally, they are located at or near academic centers to permit access to laboratory facilities or special equipment when needed.

— The HTCD/U.H. working group has given the establishment of Incubator Facilities a high priority. We believe that one is needed at Manoa and that you will need one near the MCC campus. As I mentioned earlier, we are investigating how other high tech centers handle the technology transfer question and will be happy to assist as needed to develop a Maui Incubator.

**6. Market Hawaii as a High-Tech Center.**

- I am firmly convinced that the way to sell out our three high-tech parks is in aggressively marketing Hawaii as a center for high technology. This has got to be a cooperative effort involving the HTDC, the Maui and Oahu Developers, the Economic Development Boards and of course DPED.
- Much has been started in marketing already:
  - In October 1984, state delegations including: HTDC, EDCH, MEDB, HIEDB, Oceanic Properties and Campbell Estate sponsored an exhibit at INSITE 84, an international Industrial Site Exposition attended by representatives of 18 foreign nations and 23 states.
- The Western Airlines inflight magazine for February 1985 contained a Hawaii high tech article contributed by HTDC. All three high-tech parks were discussed. Since then *High Technology* magazine, the industry's glossy, included a similar article in its May 1985 issue. As well as nationally circulated *Plants, Parks, & Sites* May/June 1985.
- The *Far Eastern Economic Review* published by Dow Jones and circulated widely throughout Asia will run a "Hawaii, Keystone of the Pacific" supplement in its May 30 edition. The Corporation has cooordinated the input of the Maui and Oahu developer to put together this full page ad on Hawaii's high tech parks, which will be our first exposure to the Asian market.
- Last year the Hawaii High Technology Council began publication of a quarterly high tech journal using funds donated by Castle & Cooke. The Magazine was funded at $50,000 for its first four issues, one of which featured the Maui NifTAL Project and Hawaii Biotechnology Group's efforts to develop anti-cancer medicine from a particular Maui coral species. When Castle & Cooke advised that due to their financial predicament the company could no longer provide funds for the magazine, which has been a tremendous high tech marketing tool, the legislature stepped in and appropriated $20,000 in each year of the Biennium to help continue its publication. We will need another $20,000 each year to keep the quarterly schedule and high quality and hope the private sector will help us in this endeavor.

## THE ROLE OF A LAND-GRANT UNIVERSITY IN ECONOMIC DEVELOPMENT

**Dr. John Cantlon**
**Vice President for Research & Graduate Studies**
**Michigan State University**

I am honored to be invited to address this symposium/workshop on "The Business/Academic Partnership in The Economic Development of Maui." The discussion this morning sounded much like the ones we have been involved in at Michigan State over the past five years where we have looked at where higher education is headed and are rearticulating higher education with the national economy. Since this is my very first visit to Maui, my remarks will relate to Michigan State University and what I believe are generic rather than your specific opportunities here in Maui.

To put my remarks in perspective, let me give you a few characteristics of Michigan State University.

1. It was the first land-grant institution in the nation, having been chartered in 1855 as Michigan Agricultural College.

2. Today it is a $485 million dollar operation with 40,000 students, 17,000 of whom live on campus and about 7,000 of whom are graduate students.

3. Its graduates are primarily in the Colleges of Business, Engineering, Agriculture, Natural Science, Communication Arts and Sciences, Education and Social Science, but there are nine other colleges, including three medical schools which turn out MDs, DOs, and DVMs.

4. MSU has nearly a 30-year track record of extensive international development experience having been involved in major programs in the Ryukyu Islands, Korea, Vietnam, Indonesia, Nepal and Thailand, as well as Africa, the Middle East and Central and South America.

5. The University's general fund budget is $270 million per year, the research budget is about $100 million, cooperative extension is about $25 million and the auxiliary budgets including the residence halls, conference centers, intercollegiate athletics, etc., total about $90 million.

6. The University's administration and most faculty take its land-grant mission of *"serving the people"* very seriously. The most extensive public service efforts over the longest period have been in the agricultural and natural resource sectors of the economy. However, faculties in the Colleges of Business, and Engineering have been broadly involved with the business and manufacturing sectors for many years, and today every sector is touched by MSU's public service contributions.

One example: Professor Carl Frost, an industrial psychologist, was recruited from MIT in 1944 by former President, John Hannah, who had become convinced Michigan needed an alternative to the intensely adversarial labor/management relations so characteristic in Michigan. Professor Frost was unable to make any headway with Detroit's big three auto industries, but he was highly successful with a series of smaller companies on the west side of the state including the Herman Miller Company, a leading manufacturer of office furniture. Thirty years before the Japanese emerged with their non-adversarial labor management system Carl Frost and his graduate students had helped turn a series of Michigan companies into participatory labor-management systems. Today these companies are leaders in their fields.

Michigan State became the first Land-Grant College largely because the academics of the day at Michigan University didn't want to have anything to do with agriculture. Their mission then was to train the elite of the society—the ministers, lawyers and doctors. Out of frustration, the organized farmers and legislators —the politicians and the industry of the day, which was largely agriculture and small manufacturing—put together the concept of an institution devoted to the health of the economy, which was small manufacturing and agriculture.

Michigan State got started amid great argument about where it would be located. As a compromise it was located at Lansing, where the new Capitol was emerging on a stump field of a forest that had been cleared out by the loggers. With this rather inauspicious beginning, the first of the U.S. Land-Grant Universities emerged and has grown to a half a billion dollar corporation.

However, in recent years we discovered that the University's land-grant commitment was in need of a major overhaul. The severe recession that struck Michigan in 1980-82 made the University realize that a far greater and sustained effort in economic development would be essential if Michigan wasn't to lose its technological position nationally and internationally. Every segment of Michigan's economy was in trouble. Technologies were out-of-date, productivity levels were non-competitive, the state was burdened by uncontrolled growth in public assistance demands, the quality of most graduates from K-12 had deteriorated, state government was imposing a substantial regulatory burden on its business and industry sector with no investment in long-term economic development, Michigan capital was fleeing to investment opportunities elsewhere as were the top graduates from our universities.

As we studied the situation it was clear that much of the powerful system of federally supported research and education in our universities was poorly articulated with the nation's or the state's economic development needs. The state of Michigan had no earmarked university research appropriation except that for the Agricultural Experiment Station. The state of Michigan had rather modest to no economic development investment strategy that addressed the traumatic changes necessitated by energy cost shock, non-competitive productivity levels, or the opportunities rapidly unfolding from the information, materials and biological

technological revolutions. And, University relationships with local economic development councils were at best reactive rather than partnerships.

We noted that while there was widespread land-grant-type public service activities throughout our 16 colleges, except for those which received Cooperative Extension Service support, most activities were based on chance relationships between individual faculty with expertise and a business or industry representative with enough information to know how to gain access to that expertise. Even more devastating, we found that consulting by our faculty received no rewards from their faculty peers and often such consulting was the basis for negative judgments in decision on raises, promotions and tenure. We also discovered that even corporate leadership from whom we were seeking University support were usually unaware that they were benefiting from MSU expertise. And, Michigan's citizens and legislators were largely ignorant of our faculty's contributions to the state's economic well being.

Out of the shock of three years of budget cuts (accompanied by inflationary erosion of our remaining purchasing power) and the discovery that our very substantial efforts were poorly known and appreciated both on and off-campus, we inaugurated a program to improve Michigan State University's modes for contributing to the state's economic development and diversification. In a phrase, we began the serious task of restating our land-grant tradition in the modern idiom.

To save time and, hopefully, to make my remarks of more use I will now identify nine obstacles to effective university contributions to economic development and the steps to mitigate or remove them. These are not in priority order nor in the order we addressed them at MSU; in some cases they are drawn from other institutions, and in other cases we had removed them before the major overhaul.

1. ***Research universities are recognized today as very attractive neighbors for many industries and businesses.*** I believe this can also apply to vigorous and attenti : community colleges if they adopt an aggressive service commitment. In fact, I believe that they have more in common with where Michigan State University was in its first fifty to a hundred years of existence than Michigan State as we look at it today.

   So I'm very hopeful, and I'm pleased to see that you don't have a four-year institution here, because I think you ought to be the test model for really actuating what I think is an enormous potential for the whole of the United States.

   To become an attractive neighbor requires a restatement from institutional leadership of the original land-grant philosophy fo serving the public which supports the University and for explicitly playing a role in economic development. More importantly, it calls for taking those actions which put substance behind the rhetoric. Some of these actions will be obvious from the points that follow. To get started, an upper administration that understands what land-grant colleges are all about and is committed to that theme is a mu t.

2. ***Land-grant universities need to keep an eye on state needs more than average public or especially private universities.*** For example, at MSU we have strong physics with the National Superconducting Cyclotron Laboratory located there. Ten years ago we had plans for equal development in nuclear and high energy physics. Today we realize that Michigan is a manufacturing state and condensed matter or solid-state physics is far more likely to contribute to the materials science needs of a major manufacturing state. Therefore we are now working both on strengthening that area and building bridges to related fields in engineering.

3. ***The University's ability to attract research funding from government, industry and foundations depends upon attracting and retaining nationally competitive faculty.*** This requires innovation, risk taking and often pushing ahead in spite of occasional opposition from the bottom half of the faculty and staff. I found the document on Research at the University of Hawaii conveys a good understanding of what it takes to recruit and hold outstanding research entrepreneurs. From my own experience a list of seven examples. follows.

    - Part of the indirect costs on research grants must be returned to colleges and departments so that researchers and their peers have positive reinforcement for the additional effort it takes to remain nationally competitive. These funds must be used for research facilitation.

    - When there are multiple researchers on the same project the participants must determine their relative contributions to the effort and rewards such as returned indirect cost must be proportionately distributed to encourage multidisciplinary projects. (Most real world problems are broader than narrow academic disciplines.)

    - Departments must also be encouraged to allow differential teaching loads so competitive research faculty can sustain programs which strengthen the department. Some of our best and strongest departments have an enormous range in the teaching loads of the individuals that are in there. But they work together. They have a team, and the individuals that do the teaching are able to get some of the rewards that are brought in by the researchers.

    - Consulting by faculty experts needs to be recognized as a valuable public service. Just because the recipient of the expertise pays a fee to the faculty consultant does not make that service less important than publicly supported extension work. Most research universities allow faculty up to four days per month of consulting if it clearly is within the faculty member's area of departmental expertise.

The attitude that an individual who has skills that the business and industrial community paid for should be disrewarded by the University just doesn't make sense. Rather rewards should be given by the University in recognition.

- Retain flexible research funds for problem-solving at the institutional level so equipment breakdowns and other obstacles won't result in failure of the researcher to perform on a research contract or grant. You have got to have flexible problem solving funds accessible to keep the researcher competitive. If you are not competitive today, particularly as the Federal funds tighten up, you're out of business.

- Maintain a modest internal institution research initiation grant fund so new ideas can be developed to a point where they can be nationally cometitive for outside support.

- Hang on to your best faculty talent by countering offers from outside, and don't let prickly faculty personalities result in loss of your top producers. Good research universities learn to work productively with their prima donnas.

(This list could be extended but the general subject is obvious.)

4. ***In 1980 we discovered that some important research faculty would like to exercise their entrepreneurial yearnings in areas related to their research expertise.*** We found at MSU that we were losing top faculty in the scarce molecular biology and genetic engineering research areas because industry jobs and many private universities offered opportunities that at MSU were in violation of both institutional policy and state laws on conflicts of interest. We succeeded in getting both changed.

   It is now possible for our faculty to hold equity positions in small companies based on their research expertise and the University can negotiate patent licenses and research contracts or lease access to special research facilities with these companies. We made changes that require both a full disclosure of ownership positions and a stipulated means of removing the faculty member from potential conflict decisions by transferring the decisions to other departmental individuals or upward to the next level.

5. ***Universities cannot engage in proprietary or confidential research and continue to enjoy access to the openly exchanged research information that makes U.S. academic science so productive.*** This requires special means for identifying and moving promising incipient technologies to nearby, private, off-campus research labs. This is why your research park is such a good idea. There faculty

researchers, using their allowed consulting time, can pursue commercialization independent of more open on-campus basic and applied research.

We have found three types of structures which facilitate this technology transfer.

- We have encouraged the emergence of one and possibly two *technology parks* near the university so industry and academic researchers can interact without the high cost of travel and with joint access to special research equipment in both the university and the technology park. Industry will also value resulting close accesss to the recruiting sources of new graduates, the opportunity to recruit scarce researchers who want access to adjunct faculty appointments, and students make high quality temporary employees. Parks also help universities to recruit scarce talent who like nearby consulting opportunities.

- A university can help establish one or more for-profit R & D companies whose primary role is identifying and transferring potentially commercializable research off-campus. It is best if these companies are not owned by the University since serious potential conflicts of interest would be inevitable. At MSU our independent MSU Foundation established NEOGEN for this purpose and over the company's four years of life the Foundation has sold off 70 per cent of the management stock to raise venture capital. The Foundation has retained the class B non-management stock, the majority of which must approve any amendment to the Articles of Incorporation and Bylaws of NEOGEN. This tied it to the University. NEOGEN supports about $1 million in non-proprietary biotechnology research per year on campus. We are seriously considering start-up of one or two more for-profit R & D companies, one in management expertise and another in equipment.

- The State of Michigan has established three free-standing not-for-profit R & D institutes which will play similar roles to NEOGEN in close interaction with the state's two largest research universities. The Michigan Biotechnology Institute is located at MSU and will commercialize biotechnology processes for transferring Michigan's agricultural surpluses, wastes and under-utilized forest products into chemical feedstocks and special products. At the University of Michigan the Industrial Technology Institute has been created to speed transfer of research into internationally competitive automated flexible manufacturing technologies. A third such state institute, the Michigan Material Processing Institute is on the drawing board. CEO's of major Michigan Corporations—e.g. Dow Chemical, Upjohn etc. are on the Boards of these institutes.

6. ***Universities need to examine their patent and copyright policies*** to insure both that they encourage commerialization of discoveries in the state that supports the university, and that faculty researchers and departments are rewarded for devoting the additional attention this function deserves. My reading of the University of Hawaii's policies suggests you already have a very enlightened approach. Ours was in need of revision which is now complete. We made three changes which we believe contribute to Michigan's economic development:

    - We have moved to share royalty income much more generously with both faculty inventors and their academic departments.

    - We have made certain that Michigan companies have the first opportunity for licensing our patents and copyrights.

    - We have adopted greater flexibility in working with patent and copyright licensees to help insure that commercialization will be successful.

    I can provide detail on each of these but in the interests of time I'll identify other economic development categories. Before leaving this topic, however, I must state my belief that royalty income to universities is unlikely to be a large revenue source. I urge the institution to retain ownership, nevertheless, as a means of keeping the public and the licensee aware of academe's contribution. We occasionally encounter business and industry pressures to give up ownership of our patents in return for research support. We do not believe this is helpful to a healthy long-term partnership. We have a few cases where, due to one or another reason, we have failed to retain ownership in what later develops into a very successful new product or process. The enthusiasm of faculty researchers clearly suffers when neither they nor the University receive any reward, and anti-business feelings of faculty and students who learn of the one-sided relationship get strongly reinforced, which interferes with good university/industry relations.

7. ***Clarifying and insisting upon payment by business and industry of the full costs of research contracts*** except for joint projects is another sound way to keep university/industry relationships healthy. At MSU we normally insist that industry research grants pay our full indirect cost rate. We do so because, as every corporate head knows, indirect costs are as real as direct costs. If only the direct costs are paid the University must subsidize the product equal to the unpaid indirect costs. University general funds at our institution are one-third derived from student fees. I would submit that it is inappropriate to subsidize research services to industry with monies collected either from students and their families or from state, federal and private student financial aid funds. When it is in the public interest to subsidize individual research projects for industry the appropriate vehicle is

contributed faculty time or charges against a state, federal or foundation account designated for that purpose.

8. ***There is need to build a network of organizations within each state to improve business and industry accessibility to university and college expertise and special facilities.*** It is our experience in Michighan that not all business and industry problems or opportunities need, or can effectively use, top university research expertise. (This is a good thing since there really isn't a large supply of underutilized research talent in most universities).

   In order to use the full array of higher education talent there needs to be good working relationships between the research university, regional and private four-year colleges and two-year community colleges. These arrangements can take several forms. At MSU we have negotiated a special agreement with the community college nearest to us, and we are currently exploring relations with the greater Grand Rapids consortium of about ten public and private four-year and two-year institutions one hundred miles west of us.

   Michigan urban community colleges in particular have access to part-time faculty, who have good business and industry connections. These colleges charge lower fees for instruction and workshops than research universities, they can provide technical training for workers as well as many university two-year curricula, and as a set they are physically located nearer the points of much business and industry need.

   Getting a smoothly working consortium underway is a difficult challenge since there are all kinds of jurisdictional and perceptional hang-ups among the groups. It can be done, however, and it is essential to building a cost-effective system of business and industry assistance from universities.

9. ***State and Local Government Roles.*** Obviously my statements here will reflect our University's experience and I do not suggest this information is generalizable.Clearly in economic development efforts state regulations and their administration, the labor/management climate and its politics, taxes, schools, transportation, water supplies and other infrastructures, amenities, finance aggressiveness and willingness to bargain in recruiting new firms are pivotal state issues over which universities have had little influence. I have participated in state level negotiations to attract new industries that were of high quality and have had second hand reports on some that were disasters. My overall impression is that Michigan is not always at its best. Universities do have something to offer to this task and, in my experience, they are not used as frequently nor as effectively as they could be. Often universities are perceived by state agencies as competitors which I find puzzling. There is no way in the world we can be competitive, or even be perceived as competitive with state departments of commerce or economic

development offices.

A very wise investment would be a joint conference involving the economic development councils, the relevant state agencies and the key higher educational institutions to address how to build an effective partnership. It is clear that your symposium/workshop has such an objective and a focus. I have read your reports and plans for economic development of Maui and the state of Hawaii as well as considerable material on the University of Hawaii. I am not qualified to make judgments about those plans since my knowledge of your state is so limited. One thing that did strike me is the inconspiciousness in all of these documents of such words as world trade, international marketing, international communications and related issues.

It seems to me that the transportation cost handicaps influence much of what succeeds in Michigan. One commodity which can be transported at very little cost is information. I would think that in today's information revolution Hawaii's position at the mid-point between two of the world's great producer and consumer regions would make it the ideal location for becoming the brokering center for the Pacific Basin. This geographic good luck is reinforced by the multi-cultural character of this state's people and the high level of amenities which makes these Islands a unique global resource as your documents clearly show. Shaping these advantages to the challenges of international trade might pay long-term dividends.

Building toward these longer range objectives requires that existing elements of the economy must each be nurtured and maintained at its competitive cutting edge. As every executive knows, cash flow is dependent upon the firm's products or services having a real market. Strategic plans are essential to long-term economic development but planned innovation to find and to serve existing markets is the bread and butter of both land-grant universities and existing business and industry. In other words, we must pay attention to what we are doing now. We can't put our minds out there 20 years at the expense of serving our existing economy. Government, whether local, state, national or international, has essential roles to play, as do universities and the private sector. The winners in the intensifying international competition will be those countries, states and local units that meld an effective joint effort. Universities, industry and government in socialist countries all are part of and serve the state, and in Europe and Japan there is a kind of partnership that is more intense than is generally true in this country.

The democracies must put more of their collective energies into building healthy economic, technological and social strength and this is a proud and traditional mission of the land-grant universities. This symposium/workshop is symptomatic of the good news that this process is gathering momentum and will do much to help restore the health of the academic/business relationship. I look forward to learning from your efforts.

## THE COMMUNITY COLLEGE ROLE IN ECONOMIC DEVELOPMENT

**Dr. Stanley J. Spanbauer**
**District Director, Fox Valley Technical Institute**
**Appleton, Wisconsin**

I am very honored and privileged to be here to discuss the role of community colleges in economic development with you.

I spent the better part of the past two days working and discussing with Alma Cooper and her staff at Maui Community College. I'm very impressed with the kinds of things that are happening at that community college. Particularly I am impressed with the innovative planning that has been done. Maui is very fortunate to have a person of Alma's caliber as an educational leader. The faculty expressed great enthusiasm toward the innovations being pursued. The college has laid the foundation for a strong economic development program, a stronger economic development program than they have.

I am here today, to talk with you about economic development applications of a community college called a Technical Institute in northeastern Wisconsin—specifically, about a technical park that we are developing in Appleton, Wisconsin similar to what you are planning on Maui.

A brief background is in order. We have approximately five thousand full time students and somewhere in the neighborhood of forty-seven thousand parttime students in a number of outreach locations throughout the district. We have separate governance for technical colleges and community colleges in Wisconsin. It is apart from the university system. We have a State Board of Technical Colleges.This fact has given the local districts an amount of autonomy that is so essential, particularly in activities like economic development.

It is quite important for a community college to be organized effectively in order to provide the flexibility needed in economic development. Fox Valley Tech. was organized in 1967. At that time it had the highest cost per student in the state. Now it has the lowest cost per student.

We have a year-round multiple entry, multiple exit program, in which students are enrolling 16 times a year, and 52 different programs that are associate degree level and vocational diploma level programs. This open entry system program allows people to graduate at different times of the year. Employers like that. Over the past years since 1967 we have had a placement record of well over 90 per cent, of which 74 per cent have been employed in our five county districts.

Wisconsin has similar problems, perhaps more difficult problems than does Hawaii. We have lost so many manufacturing jobs and being basically a manufacturing state, it hurts. We are not getting our share of the new technology kinds of industry. We

do not have training and incentives, although three million dollars for training incentives has recently been included in the budget for the state. In this program, free training would be provided for the employees of new industry coming in.

The role of the community college entails more than pre-employment training and liberal arts kind of training. The community college must provide retraining so that we can cope with the fact that of all the people that will be employed in the year 2000, 75% per cent are currently employed. These people will need retraining at least five times over the course of that period of time.

It is also essential that community colleges develop customizing kinds of plant training programs and quick-start training so that an industry can get started as soon as it moves into the area with a good supply of skilled labor.

From the model that we developed, we put together a plan on economic development This plan contains policies and philosophies concerning economic development and directs the community college toward the employer as the ultimate consumer of our product, our students.

I want to emphasize the fact that we have a pro-active approach at the school, as opposed to a reactive approach. We have people assigned to blanket the five county areas, assigned to specific industries. We track them on a computer and provide customized training programs.

Currently, we have 206 individual contracts with business and industry which are for in-plant training. Most of the cost of these is paid directly to the college by the industries themselves.

Projects range in size from the largest, a $350,000 three-year project we are still working on, down to a project of a couple hundred dollars for some consulting. This is our rationale for economic development. In a technical school, it's essential that the curriculum be relevant. What better way is there to be relevant than to have your teachers and staff out there in the industry continuously?

It is also one way to get up-to-date equipment. We just don't accept obsolete equipment any more. Companies want this kind of service and are willing to provide the equipment.

We have developed an Economic Plan to serve as a blueprint for the future which has five components:

- Formal Faculty/Student Coop Education Plan for every program.
- Fox Valley TRI-Park.
- High technology demonstration/training center.
- Incubator facilities.
- Interactive telecommunications

To us an economic development plan is "an organized effort to assist existing businesses to expand or become more productive and to assist in attracting or developing new business."I should like to turn to a description of Fox Valley TRI-Park which is a principal element of our program.

## FOX VALLEY TRI-PARK

The Fox Valley (Technical-Research-Incubator) TRI-Park is a result of an active partnership with the community in economic development. The TRI-Park concept is based on the contention that a multi-tenant office/industrial park which has a defined cooperative arrangement with a comprehensive technical college will have a better chance to succeed than one that does not have such an arrangement.

Fox Valley TRI-Park is a joint venture of the Fox Cities Chamber of Commerce, Outagamie County government, Northern Lake Winnebago Private Industry Council, Job Service, area schools of higher education, other regional agencies, and business and industry of the area. TRI-Park consists of a multi-use commercial real estate project of approximately 320 acres of land surrounding Fox Valley Technical Institute. The purpose of its development is not to create another typical industrial park. Rather, the goal is to create a comprehensive business-education environment conducive to start-up businesses, while encouraging product research and fostering product development operations. The hope is that highly technical, service-oriented firms or emerging industry will locate here and diversify the industrial base of the region. An attractive, campus-like enivronment is being provided in TRI-Park. Such an unique environment is very limited in the state of Wisconsin and the Midwest.

Because of its uniqueness, this development is not designed to actively compete with private and public developments within the region. Rather, it seeks to attract tenants who would not otherwise consider expanding or relocating to this area. The project is founded on the notion that the area is in need of an industrial park that is targeted to clientele different from that currently being served. The goal from the beginning has been to create an environment for firms that would benefit from a close relationship with Fox Valley Technical Institute. According to the Fantus Company report, "A well-planned and tightly controlled industrial park offers a firm several advantages: a prepared site with the necessary zoning approvals in place; controls and standards to insure that land values are protected and that operations will be compatible with surrounding neighborhoods; and a road network designed to allow efficient movement of the goods."

The Fantus report adds that, "The shift in economic development to light manufacturing, research and development services, and office activity places a new emphasis on the attractiveness of the work environment." The research firm feels that foreign firms would especially be attracted to this type of prestigious park that includes lakes, green belts, wellness trails, restrictive covenants, architectural controls and a special relationship with Fox Valley Technical Institute and other schools of higher education.

**Justification for FVTI's Involvement**

Fox Valley Techical Institute is entering into an era of new technology with economic development ventures that are essential to the well-being of the District. This not only relates to the overall philosophy of the District, but also provides unique and necessary opportunities for FVTI students and faculty.

With rapidly changing technology and increased fiscal constraints, it is essential that every full-time instructional program engage in some type of collaborative activity with business and industry. These real-life experiences will ensure that students and faculty obtain on-the-job instruction which cannot be provided in the school setting. This will offer experiences on equipment which is up to date, while working on projects and in activities like those actually employed in business and industry. This is an underlying objective of Fox Valley Technical Institute's involvement in TRI-Park. While the TRI-Park concept places FVTI in the role of assisting agencies in the recruitment of new industries to the region, it should be stressed that such involvement has an additional important goal of improving the school's programs.

## TECHNICAL PARK TENANTS

TRI-Park will recruit product research and development operations, highly technical and service-oriented firms, and light industries that have an interest in expanding or developing new businesses in a well-planned, tightly controlled, campus-like atmosphere. All tenants would agree to strict regulatory covenants to insure a quality complex and guarantee educational planning with the technical school. The following types of tenants are being recruited to locate in the TRI-Park:

**Association or Agency Training Headquarters:**

One section of TRI-Park is designated for national or regional training headquarters of associations or agencies. These training facilities will be used in two ways:

- To provide training and other services for the association or agency staff employees from the region, or in some cases from throughout the country, and the world.

- To provide specialized training for full-time students who are attending Fox Valley Technical Institute enrolled in vocational or technical programs and area workers enrolled in retraining or upgrading programs on a part-time basis.

In such a facility, a training director will be employed by the association and specialized equipment would be donated by the association or agency. A number of services will be provided by Fox Valley Technical Institute including maintenance, food services, media services, word processing services and data processing services. This type of working relationship will have a positive effect on the learning experiences of many regular students at the college. The school will use

the training facilities and have access to new equipment for occupational training. In addition, there would be upgrading experiences for FVTI instructors and opportunities for the use of media and other instructional resources which are donated by the parent organization.

**Demonstration/Marketing Center:**

Another section of TRI-Park is to be used for demonstration and marketing of equipment. New equipment will be moved into these facilities as it is released by the manufacturer for use by business and industry, and the equipment will be used for training purposes by FVTI. While the equipment is being used for instruction, it will also be available for special demonstrations to potential purchasers. Faculty and students will be involved in the marketing demonstrations with actual learning activities being conducted while using the equipment in a marketing mode.

The Demonstration/Marketing Center will have a positive effect on learning experiences since students will be obtaining competencies on the latest equipment available. Both students and staff will receive real-life experiences on updated equipment being introduced to the region.

**Research and Development Center:**

In cooperation with the University of Wisconsin, Lawrence University, the Institute of Paper Chemistry, and other area institutions of higher education, as well as regional business and industrial concerns, a section of the Technical Park is devoted to research and development. These facilities will be used to conduct research on new products and new services for area business and industry. Such a center might be established by an individual firm, or it might be organized to serve a number of related businesses or industries. In this research and development setting, engineers, technicians, and interns from the universities and student technicians from Fox Valley Technical Institute will work together on various projects. The R & D concept will be especially attractive to Fox Valley Technical Institute since it will provide rare opportunities for instructors and students to interact with engineers and technicians on projects related to programs which are offered at FVTI.

**Incubator Mall for Small Business and Industry:**

Another section of TRI-Park will be reserved for an Incubator Mall. Incubators signal a new approach to economic development, one which emphasizes the importance of cooperation, rather than raw competition in the building of a better business climate. In the past few years, incubators have been started by universities, community colleges, local governments, community development corporations, and for-profit corporations, such as Control Data Corporation. While an incubator is included in the immediate plans for location in the Fox Valley TRI-Park, it should be noted that incubators can be located anywhere in the region and the college can still be involved in numerous ways.

The TRI-Park Incubator Mall will include a group of small business enterprises.

Each of these businesses will lease space from the TRI-Park Corporation for a specific period of time. Upon completion of the lease, the new business will obtain its own venture capital and will relocate to another area, preferably to a community or private industrial development area.

Despite the growing importance of entrepreneurship in our economy, new and expanding young firms face serious barriers to obtaining adequate and affordable space, organizing and managing a business, securing financing, and finding qualified employees. Although most young manufacturing firms do not need a large space in which to operate, suitable small spaces are usually limited and more expensive than larger building spaces. Finding skilled management and employees can be difficult for a business providing a new product and service.

The industrial incubator is a vehicle for reducing these obstacles. An incubator is a place where small businesses can get started with inexpensive rent and/or flexible work space. Some facilities also offer management and training assistance as well as business services and financial help to their tenant firms. Incubators can benefit entrepreneurs by:

- Creating a synergy among tenant firms — tenants often share equipment and give each other business.
- Eliminating business maintenance responsibiilities.
- Providing an environment where they are not alone, thereby reducing the anxiety of starting a new business.
- Increasing their visibility.

### New Technology Firms

In addition to these targeted tenants it is anticipated that a number of new technology firms will locate in TRI-Park. Restrictive covenants will insure that the firms have a relationship to one or more programs at FVTI and that a written educational plan is prepared and updated yearly.

An important factor that will contribute to the success and quality of the TRI-Park is the relationship of Fox Valley Technical Institute to the tenants. The supportive nature of this institution is an asset in the recruitment of firms to the Park. In addition to its direct involvement in recruiting industries, the following services will be made available to all TRI-Park tenants:

- **Quick-Start Instructional Programs** — Customized instruction which relates directly to the specific firm is available upon request. This includes the design of coursework, the construction of media packages and learning kits which are correlated with the skills required for employees, as well as the actual delivery of instruction to prepare employees for the start up.

- **Technical Assistance and Consulting Services**—An array of these services are available to meet the individual needs of tenants and the availability of FVTI and area universities to provide the services which are requested.

- **Tenant Staff Development Services** - Assistance will be provided as requested in the design and implementation of a staff development plan for each tenant in the TRI-Park.

- **Career Development Placement Services** - A comprehensive career development program is available through FVTI. Included is a computerized self-development program. An up-to-date placement service also provides computerized reports of current job listings and available graduates for area business and industry.

- **Research and Library Services** - Computerized, statistical packages are available, as well as access to national data bases. Research networks with area universities will be available. An extensive technical library is available at the technical school.

- **Employee Testing Services** - All the major testing systems are available for business and staff evaluation services. In addition to the usual instruments, customized test packages can be developed upon the request of the tenant.

- **Cooperative Work Experience** - Use of advanced FVTI students and university students in cooperative work arrangements with the TRI-Park tenants will increase the relevance of training programs for all businesses in the Fox Valley and provide additional, inexpensive workers for firms.

## BUSINESS AND INDUSTRY TECHNOLOGY CENTER

At the core of the TRi-Park is a Business and Industry Technology Complex which provides available services for inventor-entrepreneurs. Here they can receive assistance in developing their ideas and concepts into a viable product. The building is designed to accommodate the needed training services on a flexible schedule for TRi-Park tenants and communtiy participants. The school will enhance its efforts to work directly with business, industry, and agencies to identify the participants' needs and meet those needs through customized training and technical assistance programs. A communications network will be established to assist with the coordination of community resources and to provide direct assistance as needed. This will provide the targeted group with access to local expertise in order to foster new business development.

Included in the building are the following functional areas to assist tenants of TRI-Park and others from the region who desire to take advantage of the services available:

**Technical Resource Area:**

- The area is designed to provide technical resources to assist area business personnel, journeymen and others who conduct research and development functions related to their specific business. Computer technology will allow for immediate access to research and other capabilities of the universities of the area and the state. It is envisioned that this center will access the research capability of UW-Madison, UW-Oshkosh, UW Center-Fox Valley, the Institute of Paper Chemistry, Lawrence University, and major data bases around the country. Included is a computer software analysis center for business and industry, and computer-generated technical information.

  This customized network is designed to place inventors and entrepreneurs in contact with one another and other community resources. These resources will provide direct assistance in doing feasibility studies, marketing plans, setting up accounting systems, obtaining permits and patents, designing contracts, and providing other kinds of information. This network includes the Service Corps of Retired Executives (SCORE), area Chambers of Commerce, the Wisconsin Association of Manufacturers and Commerce, and the resources of the Wisconsin Department of Development. In addition, the Small Business Development Centers operated by the University of Wisconsin System would be included, along with various experts from the staff of Fox Valley Technical Institute and other agencies.

  Also found in the Technical Resource area is a Library and Information System to assist businesses and participating associations who wish to gather, select, and research materials. Available in the library would be traditional materials such as books and magazines and technical journals. At the same time, computerized resource networks would be identified and made accessible.

- **The Professional/Trade Association Center:**

  This section of the High Technology Economic Development Complex focuses on meeting the needs for upgrading and retraining of various professional and trade association members. This center will provide specialized training and services for each association on a local, regional, or in some cases, national or international basis. Facilities would be available for regular seminars, product and process demonstrations, trade shows, and professional roundtables. Some regional offices will be physically located in the center making possible a number of support services to be provided through the Fox Valley Technical Institute.

- **Telecommunications Center:**

  Teleconferences—electronic meetings—are in the forefront of today's new communications trends. They represent important techniques of the

information age and the communications revolution made possible by computer and satellite technologies. This center will become the state-of-the-art electronic hub of the high technology facility. It will allow for two-way communications of data, audio and video, with access to data bases necessary to serve the tenants of the TRI-Park and the businesses of the region. Downlink and uplink capabilities will be controlled through this area to permit origination and reception of specialized programs for business and industry on a national and worldwide scale via satellite communication.

- **Conference Center:**

  This center is designed with unique rooms separated by expanding walls for maximum flexibility. Outside access will be provided with adequate door sizes for moving large equipment for demonstrations. Highly aesthetic in design, decor, and furniture, this center will provide an ideal environment for community business activities and conferences, and will be the center stage for the entire technology facility. As FVTI's theater for presenting state-of-the-art technology to business and industry, the center will host large seminars, small group meetings, customized training sessions, and satellite conferences.

- **Product Development Service Area:**

  The Product Development Service Center is an area where inventors and entrepreneurs will have opportunity to do basic research on potential products. It will also be available to area businesses for off-site testing of new products or equipment. This testing might be done by student interns, instructors, and/or business personnel. In this research and development setting, engineers, technicians, interns from universities and student technicians from Fox Valley Technical Institute, will work together on research projects. A particular focus will be on productivity and efficiency to enhance the local economy. The Product Development Service Center will become the major link to incubator centers which are located throughout the region. Industries which locate in the incubators will utilize the services of the Product Development Service Center prior to and during the incubation period.

- **High Technology Demonstration Area:**

  The High Technology Demonstration Center is designed to provide a facility capable of hosting new technology equipment, related demonstrations, and short-term training activities. Its design and construction will allow maximum flexibility for use by a variety of organizations in need of a suitable location and environment to conduct equipment-related group seminars and demonstration activities.

  The lab serves as a focal point for a wide variety of "state-of-the-art"

technology and is a significant link in generating collaborative activities between area business and industry and Fox Valley Technical Institute.

## GOVERNANCE AND FUNDING OF THE TRI-PARK

The Fox Valley TRI-Park is a cooperative venture of the school, the Chamber of Commerce, the County, and other area agencies. The land for TRI-Park is partially owned by FVTI and Outagamie County. There are three parcels, two totaling 260 acres owned by the County and one of 60 acres owned by FVTI.

A non-profit organization has been developed to market and manage the TRI-Park. This organization will operate under a strict code of covenants which clearly define operational guidelines, architectural restrictions, and cooperative educational programs. The majority control on the Executive Board lies with the College, the Chamber and the County.

Funding for the TRI-Park is coming from five major sources. The County Board is donating land for TRI-Park, and is also bonding for funds to be used for developing the property. As parcels are sold to tenants, these funds will be returned to the County. The County is also providing funds for the High Technology Building. These funds will be returned to the County as the FVTI parcels are sold.

The Economic Development Administration (EDA) has provided a grant of $770,000. to assist in the construction of the High Technology Building. Future funding is being projected for the construction of an incubator mall and for the possible construction of a business which will be operated by and used as a training site for handicapped and disadvantaged persons. Additional funds will also be solicited to assist in further development of the property.

The State Board of Vocational, Technical and Adult Education provided an initial research and development grant of $20,000 to conduct the research and design the plan for TRI-Park. In additon, the State Board has contributed $175,000 to assist in the construction of the High Technology Building.

Fox Valley Technical Institute is providing $500,000 of district funds for the construction of the High Technology Building. An additional $800,000 is being used to provide high technology equipment for the laboratories in the new complex. The College will also include its sixty acres of property in the land bank which will be under the control of the TRI-Park corporation.

The final sources of funding include business and industry and individuals in the community. In particular, donations in the form of instructional equipment will be used to help equip the laboratories of the high technology facility. The funds from sales of property to TRI-Park tenants will be used to further develop and market TRI-Park.

# MARKET FORCES AND LAND-GRANT UNIVERSITIES: THE RESEARCH PARK AS A RESPONSE TO A TRANSITIONAL ECONOMY

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The phenomenon of involvement of land grant universities in regional economic development is market driven. Our experience at Washington State University and our discussions with a dozen other mainland universities, indicate that the potential economic partnership between academia and business involves a number of inter-related economic trends. Combined, these trends provide a nutural impetus for cooperative, educational, research and business ventures between universities and the private sector. In order to take advantage of the opportunities, however, universities must be willing to flex in order to take on some entrepreneurial characteristics. The trends below and a proposed organizational response to them are outlined in this paper.

- ***Transition of the Economy from Industrial to Information Base.*** As a national and global economy, we are experiencing a transition from an industrial, product-based economy to an economy based on information, knowledge and service.

- ***Increased Demand for Basic Information.*** The trend towards an information-service based economy, in turn, causes increased demand by business organizations for information developed through basic research activities of university faculty. New emphasis is placed on *basic* research which offers new knowledge and new technology. Business, in turn, uses this basic information through *applied* research to compete for their place in the market - to innovate, to maintain or gain market share, to increase efficiency and reduce costs by using limited natural or human resources more efficiently.

- ***Universities as Information-Service Brokers.*** Increased demand for basic research, according to the very basic laws of supply and demand, places more value on university research work than we have seen in the past. The demand puts the university in a potential seller's market. Research is no longer "academic", but essential to corporate innovation, product improvement and market share maintenance. The word *"potential"* is emphasized in this case, since most universities have yet to realize they can be sellers of information services.

- ***Demand For Location Near Universities.*** The increased demand for basic research results explains a major reason for the blossoming of research parks - there are about 100 such parks either existing, conceived

or being developed nationwide, as described in the December 1984 issue of *Plants, Sites and Parks*.. Real Estate developers seek to locate their projects in an environment attractive to sectors of the economy that are growing the fastest. These projects are located with access to university campuses to attract the fastest growing sector of the economy—what we are popularly calling high technology. A research park is, after all, a simple concept. It's a place—and an organizational setting—for university scientists to work with industry in transferring university originated information and technology to the market place.

There are other trends which place demands on universities to participate in the process of economic development.

- ***Declining Federal Support for Research.*** Federal support of research and development and higher education is declining. Clark Kerr, president emeritus of the University of California system, states that the next three decades will be an "era of state government for higher education". Federal support is now dedicated to defense, and that policy decision is generating a national debt that will take the country decades to overcome. The end result is that with decreasing support for federally sponsored research and development, university scientists and administrators must look elsewhere for support. Industry, with its increasing appetite for basic research and development, is one major other source for support. This is true even though industry often prefers a different set of research performance characteristics than does academia. Would-be entrepreneurial universities must be willing to offer research products and services palatable to industry users. Universities must also deliver research and information through a streamlined transfer organization, while maintaining quality standards for basic education and academic research.

- ***Declining State Support For Universities.*** In spite of Dr. Kerr's remarks about state support replacing federal support for higher education, state financial support for universities is also declining. This is caused in part by enrollment decreases—which are, in turn, tied to state education funding allocation programs—and by a general lack of public satisfaction with the products and services being delivered by universities to society. This lack of satisfaction sooner or later makes its way to legislative centers at state capitals and ends up as reduced salary and program budgets for state universities. Land-grant universities are often the first to feel the impact of state cuts, and are generally unable to defend themselves from the impact of cuts make on their operations. A main line of defense, however, and one that must be regarded as a key opportunity in the transitional economy we are part of, are the revenues universities gain through indirect cost recovery from research and service operations. Increased research, university based innovation, local business development and consulting opportunities also benefit the university by increasing its capability to attract and retain quality faculty and students.

- ***Increase in Business Based Education.*** Private, corporate supported education is also expanding rapidly, providing competition for educational programs that once were within the domain of the university. According to The Carnegie Report entitled *"Corporate Classrooms: The Learning Business,"* businesses are spending increasing amounts educating their own employees - from $70 to $100 billion annually—compared to the $130 billion annually spent on conventional institutions of higher education. And, also according to the Carnegie Institute report, private business education is handling a total of 7.6 million students—a number of students equal to that taught by U.S. public and private institutions of higher education. Corporate education, which ranges from remedial reading and training to degree granting programs, institutes, and satellite campuses, has been developed not to compete with higher educational institutions, but to fill market niches not filled by slower moving —non entrepreneurial—educational institutions.

- ***Transition to A Service Economy.*** Finally, the trend toward a service economy also foretells the nature of current problems and future opportunities for land grant universities. Not only new, high tech industries but also traditional, product-based industries, are making the switch toward a service base. An article by Irving Carter in May , 1984 *Harvard Business Review* explains how major basic industries—chemicals, appliances, electrical supplies, paper—are introducing service into their market delivery systems.

  Carter points out how traditional industries and companies, pressed by competition and faced with declining national and global market shares, (somewhat similar to public land-grant universities), have flexed their muscle with in-house expertise and existing capital resources to expand their sales by adding service to accompany their product and production lines, and by utilizing existing underutilized resources in new ways. For example, International Mineral & Chemical, a producer of agricultural chemicals and fertilizers, introduced a computerized farm management service which was profitable in and of itself, and which added to customer satisfaction and to sales of basic product. Dupont, in a similar fashion, turned a health and safety system it had developed for internal use, into a profitable service delivery system and consulting service for other corporations. Compared to the private sector corporate environment, university resources are vastly underutilized - from land and equipment to facilities and people. Universities can learn a great deal from these examples, and can take advantage of many underutilized resources to offer services to and, in many cases, share business opportunities with their local, regional and state communities.

  The trends above point to many opportunites for land-grant universities to learn from the corporate model, and to interact and exchange resources with the private sector. Each problem setting trend creates an opportunity for university leadership willing to venture into new

territory. The trends also explain the emergence of what can now be described as a popular phenomenon at universities around the U.S.—*The Research Park.*

**Research Parks - Catalysts for Academic-Business Activities**

The Research Park is a place and—just as important, but more difficult and often overlooked—an organizational setting for industry people to interact with university people to enhance existing corporate research and development activity, and, at the same time, to enhance the university research environment. The Research Park also exists to foster innovation and to transfer technology from university basic research to corporate applied research and development. In less common instances, research parks can help bring new technology developed by the entrepreneurial researcher to the marketplace in the form of a successful, profitable business. To accomplish these ends, a Research Park requires several components. What follows is a model we are developing in the state of Washington, for Washington State University and the University of Idaho.

**Comparison Between Washington State University and Maui**

Prior to summarizing the WSU model, I'd like to point out some similarities and differences between our situation at WSU and your situation here in Maui.

*Similarities*

- Remote, location —with corresponding need for telecommunication
- Small - WSU population is 17,000 students with an adjacent rural educational support and agricultural community of about 7,000
- Ailing state and regional forest products and agricultural economy
- Supportive community—enthusiastic supporters of economic growth
- Limited economic resources of the university and the community

*Differences*

- Greater economic base of Maui
- Greater population base of Maui
- Greater research activity at WSU
- Climate

Given this brief basic comparison, below is a basic outline of the concept of a Research Park as a research, business development, marketing and economic unit of the land grant university. Since the Park concept at WSU - and at other parks across the U.S. - is market driven, it is best understood as a simple market exchange.

**Research Parks as Market Exhange**

As a partner in the exchange, the university provides the following:

- ***The Place***

  Reasonably priced land, adjacent to the university, ready for construction with zoning, infrastructure, covenants and architectural guidelines, financing, developer-architect-contractor team under contract, university liaison with private sector, and preferably, with a business incubator facility in place.

  The incubator provides an environment for small business inovation and start-up at a reasonable cost to the business customer, and at a reasonable cost to the taxpayer.

- ***The Organization***

  Access, through the research park office, to university research faculty, administrators, equipment and specialized lab space, libraries, athletic facilities, dedicated senior level university administrative support, and a strong, patient, active and reliably funded marketing effort.

- ***The Organizational Setting***

  An open, cooperative climate with a positive —sometimes aggressive— attitude about being able to do something new, and do it well in a reasonable time frame, with the profit motive in mind.

- ***The Catalyst***

  A business oriented organization with support for start up management; including legal, financial, accounting and market advice, and expert contact and negotiationg help for faculty entrepreneurs with investors - venture or otherwise - when warranted. Note that classic venture capital support of new business occurs in only one tenth of one percent of all new businesses, and that local, regional or intra-industry support is a much more likely source of funding for small business start-up than the true venture capitalist.

**The Academic-Business Exchange**

The University is provided in return:

- Improved institutional research environment, and increased research activity.
- Increased consulting opportunities for all levels of faculty and technical staff.
- Increased employment opportunities for post-graduate, graduate and undergraduate students.
- Improved and diversified community economic base.

Industry is provided with:

- Relatively low cost access to university faculty as consultants.
- Low cost lease access to university research equipment and laboratories.
- Access to faculty and student employment base.
- Access to existing university research programs.
- Reduced recruiting costs.
- Weekend Pac-10 football.

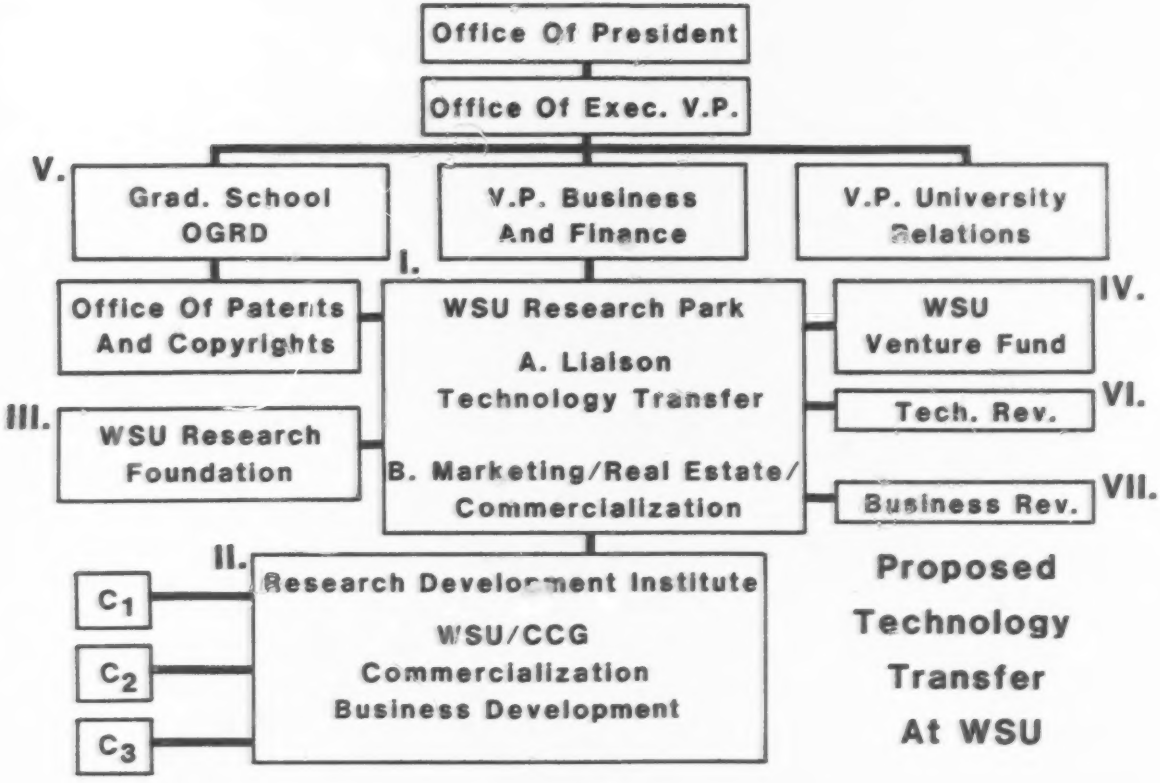
**Progress at Washington State University**

Below is a list of key milestones in our effort to develop the WSU-RTP thus far:

- Concept introduced by the Vice President of Business and Finance—1980
- Regents approval—1982
- Site selection, Masterplan #1, covenants & architectural guidelines—1982
- Preliminary organization; marketing—1982-83
- Director hired—November, 1983
- Technology transfer office and internal organization begun—January, 1984
- RFP issued for selection of developer—July, 1984
- Design competition, October-December, 1984
- Developer selected - December, 1984
- First non-university tenant—March, 1984
- Construction of Building I (50,000 s.f.) scheduled to start—May, 1985
- Marketing for lease of Building I—1985—continuous activity
- Occupancy—January, 1986
- Work on establishing institutional climate, organization and support for technology transfer between public and private sectors—continuous activity.

**Organization for The Business/Academic Partnership**

> "Universities seeking to reap financial rewards from commercializing technology developed in their research programs face a common set of problems. The first and foremost is that they are not good at business. The management structure is wrong. They are averse to risk. They cannot make timely decisions (committees don't run successful businesses). Their reward system is inappropriate for business (businessmen are not judged on the number and orgin of college degrees, publication records, citation indices or student reviews). They lack incentives to succeed in business (legislators will likely penalize them for their success). The second problem is that universities cannot correct these deficiencies to make them effective business entities without compromising the ability to carry out their primary, and much more important, mission of teaching and research." (Dr. Wayne Brown, *A Proposed Mechanism for Commercializing University Technology,* Utah Innovation Center, Salt Lake City, Utah)




Proposed
Technology
Transfer
At WSU

The statement above by Dr. Wayne Brown, former Dean of the College of Engineering at the University of Utah, points out institutional constraints universities face when contemplating business development An organization designed to attract, work with and develop businesses which are based on the information assets a university generated through its research work must provide mechanisms to overcome the constraints Dr. Brown has mentioned above. We have found that such an organization has a number of characteristics which are described below.

**The Research Park - A Physical Setting**

- A campus-like physical setting, serving as an extension of the campus itself, with reasonably priced improved land, zoned for commercial activities and light, clean munufacturing
- A completed building with leasable space, or as a second option, a capability to complete a building in a reasonable amount of time to meet widely varying tenant space requirements
- An "incubator" space and organization which provides basic business support services such as reception, phone, word processing, duplication - and which can provide access to professional business support services such as accounting, legal, marketing and financial consultation

I. **The Research Park - An Organizational Setting** (See Figure 1)

A. ***A Liaison Office Component*** which serves as a catalyst and expeditor to make the link between business, faculty researchers and the university administration. It is important to note here that development of a research park is a complex, multi-faceted task, which involves many aspects of the university's operation. To obtain a reasonable level of confidence for success, it is essential that a park project have dedicated senior administrative level support, ranging from the university policy setting body—the president and academic vice president, to the vice presidents of business and finance, university development and the dean of research and the graduate school.

B. ***An Internal and External Marketing Office Component*** which serves to communicate and promote the research park, its facilities and organization, the research of the university and the university community and setting, both on campus and to the commercial sector at large. It is important to note that for reasons of autonomy, incentive and economy, this office should have responsibility and authority for marketing research, university technology, and information services to the commercial sector. A second marketing responsibility is that of communicating the potential of the park, its benefits, and its possibilities to university researchers, faculty and would be entrepreneurs. It is these researchers who are often the real reason for the park's existence and

will, in the long run, play a major role in the park's development and success. The marketing component of the park, with its responsibility to implement technology transfer for the university, shares three marketing functions: (1) real estate development, i.e., tenant acquisition for the park; (2) commercialization, i.e., communicating externally the achievements and possible commercial applications of university research, technology and licenses; and (3) research community development - i.e., generating an open, positive attitude in which university researchers can feel optimistic about presenting their ideas to university administrators for commercial development, and providing clear paths and support for faculty members trying to make their way through the maze of university bureaucracy. All three marketing functions are one complete, comprehensive package. In total, the package constitutes a logical way for the university to approach the challenge of transferring technology to the commercial market place.

II. **A Research Development Institute**, most likely a profit-making corporation, which has the primary function of commercializing university technology by developing and promoting product and service operations based on university research. This organization must also raise seed capital for investment in the early high risk high leverage development stages of research based businesses.

Ownership of this Institute (II) may be shared by the University Research Foundation (III) and a private sector business organization which specializes in creating new businesses. It is essential that the Institute be development and profit motivated and primarily self-sustaining. In addition, the institute, through a contract with the University Research Foundation, must return a portion of its profits to the foundation and the research park to sustain future development activity and to maintain good relations with the campus. Equally important, revenues returned by the Institute must be distributed according to pre-arranged contract terms to other components of the university.

Revenue and equity sharing formulas for the commercialization process are, of course, based on individual project cost and risk-sharing. Each transaction and contract is therefore different and depends on the amount of equity (including the market value of "sweat equity" of the faculty of staff researchers and business entrepreneurs), overhead, operating costs and risk taken on by each participant in the contract. A simple arrangement, and one that provides incentive to all components of the university, might be one in which revenues returned to the Foundation—for example, from a licensing or royalty fee of five per cent of gross income—are distributed in equal 25 percent shares to: (1) the faculty researcher or inventor; (2) the inventor's department; and, (3) the university research development office or graduate school. The remaining 25 percent is retained by the Research Foundation and the Research Park to reinvest in additional research, patent development and business development activities. It is important to note that the institute is designed to deal with commercialization and business development; and that,

under the model proposed here traditional, non-commercial research grants and contracts are handled by the Office of the Graduate Dean.

There are other related university functions with which the Research Park must interact. These are:

1. ***A University Research Administration and Development Office***, usually an office of the graduate dean, or vice president for research, which has responsibility for developing university research activities with government agency sponsorship. This office (V) may also share with the Vice President of Business and Finance, the responsibility of patent, licensing and royalty negotiation pertaining to research and service contract administration with private sector interests. However, it is important that research commercialization activities are conducted outside of this office.

2. ***A University Research Foundation*** (III), usually in the form of a non-profit corporation, which has the overall responsibility of managing university financial interests regarding patents, licensing, royalties and university related business; and which is able financially and legally to manage revenues from ancillary university activities.

   The overall organization, shown in Figure 1, might work as follows: A faculty member may visit the research park office inquiring about what is required to develop a piece of hardware he is interested in making into a saleable product. Also he may be interested in starting a business. He usually wants to know what he can do, and who he must contact, and what university regulations he must adhere to to start a business and not lose his faculty position. By the time he visits the Research Park, he usually has had some limited feedback about the application and market for his technology. In addition, his technology is usually developed out of research work he's been involved with at the university, and thus is subject to university patent rights, and a resulting university share of the royalties—usually about 5 percent.

   The research park helps the faculty entrepreneur accomplish a number of tasks. Through the research park Incubator office (I), and with the aide of the Research Development Institute and its Technical (VI) and Business Review Groups (VII), the Park will assist the faculty member in describing the technology and in having it reviewed technically. If it passes the first screening - i.e., if the technical and financial conditions are positive - the Institute with its private sector marketing contracts and management resources, can put together a prototype product and test market development The park, working under the commercialization contract that exists between the University Research Foundation, the park, and the Research Development Institute, will help initiate and manage the Institute's efforts to commercialize. The incentives for the park to do this are: (I) that the business will succeed and grow as part of the university academic/business partnership within the community; (2)

that the business, when successful, will move from the park's low cost incubator space to a larger space in the park; and, (3) that some percentage of the revenues from the 5% University Research Foundation royalties will flow to the Park for reinvestment in future ventures.

The above is one example of how the research park can serve to stimulate and help manage technology transfer at the university. Through its marketing activities at WSU, it also has served to make national and international contracts for licensing and distributing university patents. In addition, again through marketing activities with the business sector, it can help generate increased research contract activity between corporation and university colleges.

The components mentioned above, in addition to the senior executive officers at the university, can be regarded as functional activities, and can be organized in a number of ways, depending on existing university structure, leadership, available resources. The key element in designing a cooperative structure and a "user friendly" climate for the would-be faculty entrepreneur, the corporate investor, the university adminstration, and the legislative and policy governing bodies, is an open attitude of give and take, a willingness to negotiate differences, and a dedication to the success of the partnership, rather than the success or control dominance by any one of its numbers.

# DEPARTMENT OF DEFENSE
# POSSIBILITIES FOR COOPERATIVE VENTURE
# IN THE ECONOMIC DEVELOPMENT OF MAUI

**Donald I. Carter**
**Acting Deputy Under Secretary of Defense**
**Research & Advanced Technology**
**Department of Defense**

I appreciate this opportunity to visit with you and to contribute to your economic development conference. I would like to review for you some of our defense programs—particulary those within the Science and Technology or S & T Program—to show you our interests and projections. Hopefully, you could use this to determine your interests in our areas of endeavor and your possible participation with us.

First, I would like to review the rationale for our program. The United States has long relied on technological lead as the foundation of national defense strategy. This rationale has not changed, and in fact, has become stronger. Our adversaries' appetite for fielding large numbers of highly capable new weapons, both strategic and tactical, goes unchecked. The rise and complexity of international terrorism exacerbates and defies orderly worldwide progress towards personal freedom and human rights. The destructive capability of weapons becoming commonly available in conjuction with the high value of strategic and tactical targets presents widespread possibilities for opportunists.

Substantial progress has been made toward ensuring that our military capabilities are strong enough to fulfill their critical purpose. Ongoing programs are building more ready conventional forces, more modern nuclear forces, improved command and control systems and well-equipped tactical ground and air forces. The technology that provided the options for this progress was developed over the past two decades by the DOD S&T Program and the technology community of our private sector.

Technology, however, is a perishable commodity and the task is to sustain past progress in order that we will have the technical options available to provide future commanders and troops with the tools to accomplish difficult, and in a sense uncertain, tasks in many potential combat environments. We plan to continue reliance on the technology edge. It is the most viable of our options and we must maintain or increase our investment to keep our technological lead.

We plan to continue to make full use of the in-house laboratories and the industrial sectors. In addition, we will continue to strengthen our relationship with the university community by allocating to them a significant portion of the basic research program, by continuing our program of upgrading university research instrumentation; and, by supporting efforts to increase scientific and engineering education in areas of interest to DOD. Our only hope of meeting the Soviet

challenge is through the continued superior achievements in the DOD S & T Program by academia, industry and the in-house laboratories—significant components of, as President Reagan noted in his State Of The Union Address, the arsenal of democracy.

Our FY 1986 S & T Program request before the congress totals $5.3 billion. Of this almost $1 billion is for research, $2.6 billion for exploratory development and $1.7 billion for advance technology development. An additional $3.7 billion is being requested for the Strategic Defense Initiative. The S & T Program is performed by private industry, universities and in-house Army, Navy, and Air Force laboratories. There are a number of technical disciplines of importance to the military. About half of the work is done in industry, about a third in in-house labs and the remainder in universities.

I would like to dwell a bit on DOD - University relationships. The DOD depends on the university community for three important functions:

- They perform about half of our long-term basic research.
- They are the source of scientists and engineers needed to envision and build future equipment and systems.
- They are a major source of new ideas.

Over the last four years we have taken several actions to improve our interactions with the universities. A DOD-University Forum was established in 1984 to provide for periodic consultations among senior university representatives and DOD officials. It has served as a platform for discussion on a wide range of national security research needs and issues that affect the Department's ties with universities.

The Forum is fully functional and meets on a periodic basis. Among the issues dealt with over the past year have been:

- The development of policy on the relationship of export controls and university research.
- Foreign language and area studies.
- Science and engineering education.

The latter—improving the supply and quality of scientists and engineers—is of particular concern to DOD. We estimate that about 4,000 graduate students are supported through our university-conducted Basic Research Program. We have been strengthening our activities in this area by increasing the number of DOD sponsored Fellowships, the High School Apprenticeship Program and our ties to university faculties. These all serve to strengthen an area which we perceive as needing help to meet national goals and needs in the technology arena for defense as well as for our economic vitality.

In 1983 we initiated a program to help correct the deficiency in the nation's university instrumentation posture. Our University Research Instrumentation Program is a five year, $150 million program to provide items of equipment in the $50,000 to $500,000 price range which can be used in research of primary concern to The Services. In our first three years over 650 grants have been made to 152 institutions in 47 states.

However, we do not believe these programs go far enough. This year we have included in the budget request $25 million which is entitled *"University Research Initiatives"*. This "new start" is designed to address concern expressed by the Congress regarding support for the infrastructure of science and technology in the United States and to meet our long-term defense research needs.

This new start will consist of two major thrusts. The first will include graduate fellowships, research assistantships, exchange scientists and research instrumentation programs. The second thrust will be toward establishing research projects in a number of new *high risk* and potentially *high payoff* multidisciplinary science and engineering projects in emerging technologies.

I would now like to discuss several technology programs. The Very High Speed Integrated Circuit Program, usually called VHSIC, is our largest and highest priority Science and Technology Program. The objective is to develop state-of-the-art integrated circuits meeting the requirements of military weapons systems and to field this technology in a timely fashion. This program has been producing the results for which it was initiated.

The first generation of VHSIC-developed integrated circuits have internal feature sizes 1.25 micrometers and clock rates of 25 megahertz or greater. Each of the six VHSIC contractors has fabricated fully functional chips. More than 2,000 chips have been produced. In addition, application brassboards have been demonstrated; computer aided design tools have been developed; and VHSIC hardware descriptive-language has been defined. To rapidly gain the benefits of this high technology, 37 weapon system VHSIC insertion programs have been initiated. These include the Advanced Lightweight Torpedo, an electronic warfare POD, and the Airborne Signal Processor for the new army helicopter.

The second generation of VHSIC chips, with .5 micrometer features and clock speeds of 100 megahertz or higher, will provide compact high speed signal processing and data processing required by military systems in the late 1990's and beyond. Initial contracts for this phase of the program were awarded in 1984.

Another item of great emphasis within the science and technology area is the development of improved software for our computer systems. Virtually all modern defense systems are critically dependent on computers and software and will not work without them. Computers and software are the foundation of force multiplier weapons such as precision guided munitions. Unfortunately, our ability to rapidly create reliable software at affordable costs has not kept pace with advances in computer hardware.

Our software initiative includes three thrusts: The ADA standard high order computer language; the Software Technology for Adaptable Reliable Systems, or STARS Program; and the Software Engineering Institute.

Excellent progress has been made in ADA on the high order language. It is now a standard of the American National Standards Institute and is well on its way to becoming an international standard. We have certified 16 different compliers and expect 30 more by the end of 1985. Experiments conducted on the F-15 and F-20 aircraft show a five-fold improvement in programming productivity. This improvement means that for a typical weapon system program, such as the Advanced Field Artillary Tactical Data System, which requires about 800,000 lines of code, we should have a savings of at least 50% of the man hours required to write the software. As our baseline for the cost of software is about $200 per line of code, the software cost savings for this system alone should be about $80 million.

The STARS Program builds on the solid foundation of ADA to develop the techniques necessary for the effective creation of reliable software for defense systems and to foster use of this technology by the defense community. STARS will develop and demonstrate in a software engineering environment the integration of advanced automated aids, software tools and ADA compliers into cohesive systems to achieve greater automation and thus make easier the task of writing software. STARS develops the standards for the interfaces between mission critical computer hardware and the software engineering environment and between the software engineering environment and application specific software. STARS also initiates application specific software programs for uses such as avionics, electronic warfare, guidance and control, and C3. This will help achieve reusability and will transition advanced software writing technology into practice.

To assist in this, the Software Engineering Institute was established in December 1984. The primary purpose of the Software Engineering Institute is to accelerate the transition of new software technology from R & D and academic institutions to widespread use in the defense industry.

One other area I would like to address is aeronautical technology. Aviation is an area of great importance to the DOD because it is pervasive in many missions. The past several years has seen much progress. The XV-15 tilt rotor aircraft was demonstrated in a DOD/NASA Program: the DARPA/Air Force X-29 forward swept wing aircraft sucessfully entered flight test; and the Air Force AFTI F16 program demonstrated significantly enhanced combat maneuverability. Also, the first of two helicopter designs with all-composite material fuselages was flown; an 800 h.p. class engine with significantly better performance was demonstrated for use in helicopters; and 6000 h.p. class engines were sucessfully tested.

I would also like to give you a brief look at our efforts in the environmental sciences. Every existing or emerging weapon system, platform or sensor is affected to some degree by the vagaries of the natural environment. The purpose of our S & T program in the areas of terrestrial science, atmospheric science, oceanography and space science is to develop methodology to exploit, mitigate or avoid environmental effects as appropriate.

In space science, for example, we are interested in radiation, space system and environment interactions and potential hazards to astronauts and space-borne instruments from solar radiation. Many of our research and operational programs in this area are conducted in cooperation with civil agencies such as NASA and NOAA, as well as with the university community. Here on Maui, for example, the University of Hawaii operates a research oriented Solar Observatory on Haleakala and shares much of the data obtained with DOD and other agencies. In addition, the Air Force maintains an operational solar observatory on Oahu which is part of a Global Observing Network. Information from this network is used for real time forecasting of solar effects on communications, surveillance and space systems, as well as providing valuable data for R & D.

Oceanography is another important area of interest for DOD. In July of 1984, Secretary of the Navy John Lehman signed a memorandum which directed a significant revitalization of Navy efforts in oceanography. Among other initiatives, Secretary Lehman directed that the oceanography S & T programs be given increased emphasis. The end result of most of this ocean science research will be improved models for anti-submarine warfare, better forecasting capability of high seas, and eventually, coupled models of the atmosphere and ocean that allow realistic interactions over many scales of motion. Beginning in about 1987 important oceanographic research will be conducted here in Hawaiian waters, led by the University of Hawaii Institute for Geophysics and the Department of Oceanography. The project is called The Hawaiian Oceanographic Experiment, and many investigators from the Office of Naval Research are gearing up to participate. As a result of this research, we hope to have a better understanding of the chemistry, biology and physical characteristics of the ocean in Hawaiian waters. The University of Hawaii's oceanographic research vessel Moana Wave, recently refurbished and lengthened with help from the Navy, will play an important role in this project.

And now a little about people technology. Training and simulation technology is here in a big way. People are continuing to cost the DOD about 50% of its annual budget. This amount is not expected to decrease as we field new and more complicated items required to maintain our military readiness. To meet this challenge, we are incorporating new technologies in our training aids and devices. Video discs, computer generated and synthesized displays, artificial intelligence, voice recognition and synthesis, and thin film, touch sensitive displays are just a few of the technologies currently being implemented in our microprocessor training systems. One example of this is the Personal Electronic Aid For Maintenance (PEAM). PEAM is a microprocessor based device that is portable and multipurpose. It can be a job performance aid, a training device or a diagnostic aid for maintenance. Starting this fall, the Army will evaluate a demonstration prototype of PEAM on the repair of the fire control system of the M-1 Tank. Also starting this fall the Navy will initiate an evaluation of the same device as a means for troubleshooting and repairing the NATO Sea Sparrow shipboard missle system, starting in FY 1986. The engineering modifications will be made as a result of the evaluations. We see training as one of our most effective force multipliers.

These maintenance trainers using simulation instead of actual equipment can save up to 43% of the current costs of training while providing complete troubleshooting and maintenance skills. Since we cannot anticipate any great improvement in the retention of career technicians, our technology programs are aimed at getting the recruit trained and functional to perform on the job in the shortest period of time.

I would like to conclude by looking ahead to FY 1987 where our planning is focusing on three new thrust areas:

- ***Biotechnology***

  Our recent work in biotechnology has focused on the medical aspects directed toward improved vaccines and prophylaxis and therapy for diseases and chemical or biological warfare agents. We now foresee the opportunity for the development of a large number of military applications completely outside the medical area. These include bioadhesives, biosensors, microbial plastics and other materials, enzyme cleaners and de-icers, high temperature biolubricants, drag reducing polymers, and biomolecular computers. This is obviously an area where we have barely scratched the surface and will see increased activity in the years ahead.

- ***Aircraft Propulsion***

  Propulsion has long been recognized as the key to achieving enhanced aircraft performance, particularly in fighters. We are planning an aero-propulsion and materials initiative to provide engine performance improvements—150% increase in thrust/weight ratio, 30-40% decrease in fuel consumption—by the turn of the century, which in turn will result in large increases in the affordable capability of aircraft. An order of magnitude estimate of the increase is that it would be equivalent to $30 billion/year in reduced aircraft acquisition for the same force capability.

- ***Artificial Intelligence***

  We foresee broad applications for emerging developments in artificial intelligence in the areas of combat aircraft cockpit automation, "brilliant" weapons and improved logistic support. The Pilot's Associate Program and the Cockpit Automation Technology Program are the first giant steps toward reducing pilot workload in the high stress environment of single place combat aircraft. We hope to build on these efforts through such concepts as reconfigurable flight control systems and fully autonomous automatic terrain following and terrain avoidance.

  In the weapons area, we not only want a fire-and-forget capability, but through the application of artificial intellignece to advance signal processing, coupled with VHSIC computer power, we hope to achieve autonomous target detection and classification capability.

In 1981 we began rebuilding the military strength that is necessary for this country to achieve its national goals and position of leadership. This buildup is possible because of the S & T work accomplished over the past two decades. We intend to continue an aggressive S & T program now so that our country in the future will have the technology tools with which to maintain a strong national security posture.

I hope that this "tour through the technologies" has sparked your interests and that you will be able to participate with us.

## OPPORTUNITIES FOR AGRICULTURAL R&D

**Dr. N. C. Brady**
**Senior Assistant Administrator for Science & Technology,**
**Agency for International Development**
**Washington, D.C.**

I am sorry I am not able to be with you in what appears to be a most useful meeting. However, I have spent considerable time in discussions with University officials and with Mr. Donald Malcolm while in Honolulu last week attending the *Asia and Pacific Conference on Malaria* sponsored by the University of Hawaii and the Agency for International Development. I am impressed with the ways you have begun to work together in planning your future, with the objective of utilizing the economic potential of your island more effectively.

It appears that communities that can find ways to work easily with Universities can more readily improve their economic base with new and innovative business opportunities. Here, the ease of research and administration and contracting, the recognition and motivation of research professionals, and the commitment of the University to being involved in both basic and applied research are important factors in the success of a partnership. Judging from the discussions I have had and the content of your symposium program, I believe you are well on the way to defining what you need to do to enchance your mutual effectiveness.

Maui appears to be a wonderful natural laboratory for biotech work in agriculture — with its range of micro climates and elevations wherein agricultural and forestry products can be grown. You have on the island a sequence of ecological conditions which are very important from the standpoint of biology and ecology. You are able to test within a relatively short distance the adaptability of a large number of plant species. As a result, you have on hand a series of environments which are similar to those faced by scientists, including agriculturalists and foresters, in the developing nations of Asia. I hope you can so organize your research and training efforts to fully utilize these ecological situations. You should seriously look to ways and means to strengthen ties in this field - one in which Hawaii has its roots and a real heritage.

I am also impressed with the possibilities of training for developing-country scientists. Maui offers an opportunity for such scientists to see how modern science can be used to help solve their problems. A location such as that being used by the NifTAL project of the University of Hawaii would provide an environment for such training.

We are delighted to sponsor the NifTAL program on Maui and are impressed with the results it is achieving in its technology transfer and training mission. We would expect that its presence would provide some synergistic new opportunities to Maui in related fields.

We shall watch with interest your mutual efforts to build a business/academic partnership on Maui and wish you well. Perhaps taking bold steps in areas of your strengths and established research capability coupled with an interdisciplinary approach will be a productive strategy. Again, I am sorry not to be with you for I feel I would have learned much from your deliberations.

## THE ROLE OF THE UNIVERSITY & COMMUNITY COLLEGES: INTERNATIONAL ECONOMIC DEVELOPMENT OF HAWAII

**Dr. Seiji Naya**
**Director, Resource Systems Institute, East-West Center**
**Professor, Economics Department, University of Hawaii**

***Introduction*** - I am very happy to be able to talk to you today about the role the University and the community colleges can play in the international economic development of Hawaii. I am especially pleased because this provides me with a terrific opportunity to sell my pet idea of a "look-East" or "look-Asia" policy. Before I begin talking about the growing business opportunities in Asia and the Pacific, however, let me talk briefly about Hawaii.

1984 was a very good year for Hawaii. This is primarily because the visitor industry has done very well due to the recovery from the recession of the U.S. economy as a whole. Other sectors, however, have not fared as well. In fact, employment and job creation has been very slow. I believe that in many ways, we have reached a critical stage in Hawaii's development; it is a time for us to think about the future of Hawaii.

We in Hawaii are blessed with beautiful weather, beaches, and people. Therefore, we can continue to rely on tourism. However, the First Hawaiian Bank Research Department estimated that tourist-related jobs account for nearly 70 percent of all retail jobs, 66 percent of service jobs, and 42 percent of all manufacturing jobs in the economy. There is an obvious need to diversify our economic activities.

Two things are working against us in this endeavor, however:

- ***Air routes now bypass Hawaii***—A few years ago, all businesspeople and professors crossing the Pacific had to stop in Hawaii. Now, direct flights are available and, in fact, it costs additional money to break your trip in Hawaii. Geographically, therefore, Hawaii is becoming even more isolated. The result being that the only visitors to Hawaii are tourists. We have lost the indirect benefit of being a stopover point for academics, businesspeople, and government officials, and of having seminars and talks by people who have to stop in Hawaii on their way across the Pacific. Although the impact of this may not be readily determined, I am sure we can agree that it is to Hawaii's disadvantage.

- We also have a problem that is commonly known as ***braindrain***.. This normally refers to the Third World nations losing scientists, engineers, doctors, and other educated people to developed countries like the United States. But this is not confined to the poor countries. We have a braindrain problem in our own backyard. Our economic structure often excludes the brightest and highest skilled professionals. In particular, those in the engineering and technology fields are leaving for the mainland and are not coming back. My own son is going to the mainland

to study and I do not expect him to come back to Hawaii to live. He will not be able to find a job in Hawaii comparable in pay or challenge to those that he could find on the mainland. This trend will have an enormous demographic impact on Hawaii. As many of our bright young people leave, our average population will get older even faster than it would through other forces.

***Environment and people*** — This is not to say, of course, that our comfortable climate and easy lifestyle will not induce some engineers, scientists and professional people to remain here. For example, the University has top-notch people who could teach at other universities for higher pay and better benefits but chose to remain here to bring up their families in a relatively congenial setting.

But Hawaii's image is very soft, reflecting our orientation towards tourism. Few think of Hawaii as being a center of commerce or intellectual activity. They think merely of warm trade winds and beautiful beaches. It is very important to use this soft image to our advantage; many people want to live in such an environment. Therefore we must try to maintain a good job atmosphere. But at the same time, we will need to add a new dimension to Hawaii's image to include an atmosphere conducive to the development of other industries.

***Knowledge intensive industries*** —When considering the direction we should take to diversify Hawaii's economic structure, we need to look at areas where we can compete successfully. In actuality, we have a limited number of choices. Because of our geographically isolated position, we cannot even begin to compete in the production of hardware. But the increasing sophistication in communication networks and the service orientation of our economy make the development of a software industry a possibility. Knowledge-intensive industries do not require a hard, industrial atmosphere.

In particular, we should strive to develop high-tech industries in areas that we have had experience, and in a selective fashion with an eye to what we can do best. Some examples include: renewable energy, ocean engineering, tropical agriculture, and aquaculture and marine resource management.

***Supply-Side*** — Since several people will be talking about the supply requirements of a knowledge-intensive industry, I would only like to emphasize that the development of such an industry must be sequential. We will have to set up a good support system. A good business environment, including the availability of land and infrastructure and a reasonable tax structure, as well as a good University system are necessary to encourage firms from both sides of the Pacific to invest in Hawaii.

***Demand-Side*** — Developing demand for knowledge-intensive industries is more difficult than it is for tourism. In the past year, more than four million tourists visited Hawaii. As long as we maintain an attractive atmosphere, people will come to us. In the case of knowledge-intensive industries, however, we must reach out. The Hawaiian economy is too small to absorb all of the products of a high-tech industry. Thus, we cannot limit our focus to the Hawaiian market. Today, transportation and communication are no longer barriers. With the proper

equipment, information can travel quickly and conveniently across the country or to foreign countries. We must nurture our comparative advantage and link what we have to what is demanded in markets out of Hawaii. Asia and the Pacific region is particularly important as a potential market for Hawaii's R & D exports. I would like to take some time here to talk about opportunities in this region.

*Asia-Pacific* — As some of you know, before I returned to Hawaii to take this position at the East West Center, I was the Cheif Economist at the Asian Development Bank, on leave from the University of Hawaii. One of my responsibilities in this position was to assess economic conditions in Asia. I found that the countries in this region are growing more rapidly than any other countries in the world. This refers not only to Japan, an economic giant in Asia, and the recently awakening China, but also the newly industrializing countries (NIC's) of Hong Kong, Korea, Singapore, and Taiwan, and the resource rich Southeast Asian countries. These Asian developing countries are the most exciting and dynamic countries in the world. Except for the Philippines, these countries, including Indonesia, Malaysia, and Thailand have been the star performers of the 1970s and the 1980's. In 1984, for example, the United States had an exceptionally high growth rate of 6.8 percent, the highest since 1951. But compared to the developing countries in the Asia-Pacific region, this is not very high. Five of these eight countries had higher growth rates in 1984 and they have maintained high economic growth rates for the past 15 years or so with only a few exceptions.

***The question is, however, how can we take advantage of the growing opportunities in the Asia-Pacific region?*** With rapid growth and the higher level of development, the industrial structures of the developing countries in Asia are becoming very sophisticated. They have a large and increasing demand for infrastructural development including improvement in the water supply, and transportation and communication networks. In addition, implementation of projects to improve agriculture, education, and health facilites, and build up support services such as financial services, engineering, and technology is needed. Although these projects require considerable planning and expertise, one of the weakest areas in these economies is the lack of skilled personnel to undertake project appraisals and evaluations. Outside assistance primarily in the form of consultant services are needed to overcome this shortcoming. I will come back to this point later.

***Need for involvement of small firms*** — From my own experience, I have found that it is primarily large U.S. firms that participate in investment, trade, and projects in Asia. There is less participation by smaller U.S. firms in terms of both exports and investment. Smaller firms are often hesitant about investing in foreign countries because they lack knowledge about markets and people in these countries. This is in part explained by the fact that a few years ago, the United States was virtually a self-sufficient economy. Trade, for example accounted for only three percent of our total economic activity (or GNP). Presently, the ratio is more than 10 percent. It would be beneficial for the smaller U.S. firms to also look outward and take advantage of investment opportunities abroad.

***Trading companies*** — The Japanese small firms, on the other hand, have excelled in this area. We normally think only of the large Japanese firms such as

Sony and Toyota as being very successful. But the smaller Japanese firms have also been able to overcome the information barrier through the services of the trading companies and have been very active in foreign trade and investment.

Japanese direct foreign investment usually involves three partners: the Japanese producer, the local partner, and the trading company. The local partner does the leg work involved in setting up, etc., while the Japanese trading company provides brokerage services and market information. This allows them to take advantage of many incentives such as tax breaks and subsidies offered by the foreign governments that want to encourage this kind of investment.

Although it is difficult to duplicate the system of trading companies—so far only Korea has been successful at this—Hawaii can develop an industry which provides a similar sort of service as the Japanese trading companies. Hawaii consulting firms specializing in Asia and the Pacific can become an information link across the Pacific.

***Importance of timely information*** — I would like to again stress, however, that opportunities will not come to us; we will have to take the initiative. For example, international organizations such as the Asian Development Bank and the World Bank and U.S. AID, annually loan billions of dollars to Asian countries for development projects. Before a project is approved, there is a long period of project evaluation. The real competition for projects takes place during this initial assessment which occurs long before the projects are mentioned in trade or business journals and newspapers like the *Asian Wall Street Journal* . In fact, most of the consultants are selected by the time the projects are listed in the journals.

Timely information can thus to a large extent influence allocation of contracts. It requires, however, a good deal of homework. For example, is anyone here familiar with this publication put out by the Asian Development Bank? It lists projects for which funding has been sought from the bank and is called "Operational Information of Proposed Projects". It has a modest international subscription rate of $28 per year. Most of the other organizations have similar publications, but I find that most American businesspeople are unfamiliar with them.

***Conclusion*** — Knowledge-intensive industries require a strong university. For a number of years, the university environment has not been good. We have lost many top-notch scholars as we allowed wages and benefits at the university to lag behind other institutions. Although as I mentioned earlier, the benefits of a Hawaiian lifestyle has kept many here despite salary considerations, we must not allow the University environment to deteriorate. The stakes involved are simply too great! Having a good university affects us not only in terms of the development of knowledge-intensive industries or reaching out to Asia, but also on a more basic level. We must provide our children with a good education and career opportunities.

The University and community must support each other in this endeavor. The University of Hawaii has allowed its links to the community to deteriorate. We have not actively tried to forge these links and, in many ways, the community has

deserted the University. The community often does not realize that there are many good people at the Universiity. There is an apparent need to strengthen these links.

The University system and the East West Center can provide a rich source of information on Asia. No other university has such a large proportion of its faculty specializing in Asia. These scholars are in a wide range of disciplines, from economists and other social scientists, to those in the humanities and the arts, public health, tropical agriculture, and engineering.

Virtually every department has Asian specialists, but there is little coordination across disciplines. The professors are trained to be discipline-oriented, to look within their fields of specialty. Thus, an interdisciplinary approach with a problem-solving orientation is foreign to them. But the expertise available must be combined in order to focus specific problems in Asia and the Pacific. To do this, we need to make a greater effort to pool resources and personnel. This should include the participation not only of traditional Asianists, but also of those in the natural sciences.

In conclusion, I would like to say that the proposed "miniature Silicon Valley" or Research and Technology Park on Maui is very exciting. The success of this and other such projects, however, will depend on a variety of factors. But there is no doubt that the support provided by the University and other research institutions such as the East West Center will be very important. In additon, as I mentioned earlier, research and development, must take account of our resource endowment and location, and concentrate in fields where we have specific advantages. The University of Hawaii can do much to support the development of an internationally-oriented, or more specifically, an Asia-Pacific oriented high technology industry in Hawaii.

# VENTURE CAPITAL
# AND
# THE BUSINESS/ACADEMIC PARTNERSHIP IN MAUI

**Dr. Brian E. St. John**
**President, B.E. St. John & Associates, Inc.**
**Mississnuga, Ontario, Canada**

The perspective of a venture capitalist may seem unusual in a symposium on an business/academic partnership in Maui, but I believe that it represents a viewpoint that merits discussion in this forum, particularly at this critical time in Hawaii's economic development. Maui, and indeed the whole State of Hawaii, is faced with the reality that the classical methods of managing its affairs hold peril for the future, as the vulnerability of the County economy to third world competition in each of its major industries has demonstrated. Future large scale production of sugar is increasingly under question, certain companies have been forced to take pineapple acreage out of production in the County, and the risks and social problems of employment based on tourism have been repeatedly demonstrated throughout the world. There are many causes for the problems facing the future of the Maui economy, but a major underlying force is the shift of the world economy to the "Third Wave" information economy that is developing through rapid technological change.

In every country in the World, the rapid pace of technological change is bringing economic dislocation and shifts in employment patterns. These changes are caused in part by the appearance of entire new industries, but also by dramatic productivity changes make possible by new technology. The world is rapidly being divided into those countries or states that are becoming dominant in production from the new technology-based industries, and those that will find themselves as "customers only" for the foreseeable future. The problem is not availability of financial capital, but "intellectual capital,"— the asset of the future.

The intense debate in Hawaii on the need to improve the business climate, and the activity to create technology parks for new industry shows that these facts are well known to key decision makers in Hawaii. The pivotal role of the University in helping the State evolve a "Third Wave" economy has not been emphasized, however. To create new technology industry in Hawaii, certain active disincentives must be removed, a supply of knowledgeable venture capital must be organized, and suitable land must be sought. There remains one last key ingredient: a supply of skilled entrepreneurs with world-class ideas. Hawaii, and Maui, can either try to attract them from around the world, in competition with virtually every state and province in every developed country in the world, or it can use its own capable young people and that large pool of expatriate Hawaii-born people living outside the State. The University has a vital role to play as the focal point for the training of your leaders of tomorrow, and as an important open repository of knowledge of the new technologies that are changing our world. In fact, in the midst of two

simultaneous industrial revolutions, it could be argued that the University of Hawaii is the single most important institution in the State of Hawaii at this time.

### The Technological Revolution and Maui

There have been several "technological revolutions" throughout history, including the invention of agriculture, the development of metals, and the development of powered machinery. This last development spawned the "Industrial Revolution" in Europe during the 18th and 19th centuries, and is considered by many to be continuing today. Over the past 20 years, however, two fundamental discoveries have been made that have triggered a new wave of innovation and technological development that will have enormous significance to the economies of all countries and regions in the world. These discoveries culiminated in the development of the microelectronic circuit (the"chip"), and in the ability to alter rapidly the characteristics of living organisms through genetic engineering.

The availability of chips has triggered the electronics, telecommunications and computer industries to come into existence and experience rapid growth, while the emergence of modern biotechnology will lead to radical changes in medicine, food production, and production technology in may industries. The pervasive nature of these technologies has created an *"applications gap"* in virtually every marketplace in the world economy, and intense international competition to develop new products and new industries exploiting these fundamental technologies.

By their very nature, many of the new businesses that experience strong growth using new technology-based products or processes will be operating in market niches that larger firms will not have the inclination to enter. In so doing, however, these innovative firms will supplant competitors that are unwilling or unable to compete. For example, the Hawii aquaculture companies that first introduce biotechnological techniques to enhance productivity, increase disease resistance, and stabilize new species in the Hawaiian environment, will achieve an immediate competitive advantage over their rivals. This advantage will result in increased sales and profits. Aquaculture developments in Maui County are not as extensive as in Oahu and Hawaii, but the potential for certain species is very interesting.

Other sectors of the Maui economy would also benefit from the development and introduction of biotechnology techniques. The enhancement of crop production of virtually any species, and the introduction of new crop varieties appears to be entirely possible. The NifTAL project on Maui is an important example of this kind of research. Other similar projects should be considered. The extraordinary diversity of microclimates present on Haleakala suggests further efforts in agricultural innovation could prove profitable.

The "energy crises" of the 1970's initiated the development of solar energy research programs that appear to be coming to fruition in Europe, Japan, and the U.S. only today. Although the premature introduction of solar energy devices during the 1970's tended to discredit the area for many investors, it is a fact that a new generation of renewable energy products are at hand that will result in profitable businesses in spite of the current "oil glut". Renewable energy devices appropriate

to the Pacific Island economies could be assembled and marketed from Maui County.

Electronic testing devices, medical diagnostic hardware and software, sensing devices uniquely suitable for the tropical environment, and other innovation fields are areas of potential business opportunity for Maui County, if the right infrastructure changes are pursued. Several electronics companies are operating in Hawaii at this time, and a significant number of small software and data processing companies are present. The appearance of these "knowledge-intensive" industries in Hawaii is evidence of a developing proliferation of opportunities, caused by evolving business conditions and attitudes in Hawaii, and the progression of "Third-Wave" technology that is changing the patterns of commerce around the world. Regions with desirable lifestyles that can attract and retain capable entrepreneurs are benefitting from this trend in many countries. In this respect, the future for technology-based companies in Maui County should be very bright. In other areas of the world, these companies are usually started with a nucleus from a major university. The University of Hawaii is a vital source for the concepts that can lead to new businesses of this sort.

### The Roles of the University

Of all the institutions created by civilized man, the university has proven to be one of the most successful and one of the most stable. The medieval concept of a university was deliberately designed to segregate a community of scholars from the perils of the society of the time, and the "ivory tower" that is spoken of derisively by many today was the whole point of the system, rather than an unintended and inappropriate by-product. The goals and objectives of the modern University of Hawaii in providing qualified people in Hawaii with education; in creating knowledge through research and insight; and in contributing to the culture of this special State are unassailable. These goals are clearly what the people of Hawaii believe that they are paying for, and much of the discussion at thisworkshop will focus on the further implementation of these objectives on Maui.

In the later part of the 20th century, however, a new and unexpected role for universities has emerged that is of special significance to the Hawaii economic problem. Certain universities have demonstrated that they can play an extraordinarily important role in their communities by providing the fertile "idea soup" from which entrepreneurs can emerge with new business ideas based on technological innovation. We have all heard in detail that Stanford and M.I.T. have done this for their communities, but many less well publicized examples exist, and the numbers of firms, and their economic significance to their communities is often startling.

In the 1960's, Cambridge University, in England, discouraged industrial development: even IBM was turned away! In 1969, Sir Nevill Mott, head of the Cavendish lab, changed the University's mind. From then on, links with industry were actively encouraged. By the end of 1984, there were over 350 high-tech companies around the City of Cambridge.

The Chalmers Institute of Technology of Gothenburg, Sweden, has "spun out" some 60 companies, with the help of an Institute for Management of Innovation and Technology, a Product Development Centre, an Innovation Centre, and a "Contact Secretariat" to connect outside requirements with Chalmer's staff. Many other examples exist, and in fact few universities that have strong science or engineering faculties have been immune from the "spin-out" phenomenon for new technology-based firms.

By the very nature of universities as institutions of scholarship and education, this process has caused tension, debate, and conflict. The strong appearance of commercial motivation on campus can clearly be inconsistent with the free dissemination of knowledge. On the other hand, the conscious use of the university as the origin of new technology-based business concepts is increasingly being adopted by societies around the world. The realization is spreading that the "Third-Wave" dislocation of economies has too much potential for social unrest to allow the preservation of the universities' detachment from the commercial development of their innovation. In Hawaii, the recognition is late in coming that the University of Hawaii can directly be the source of new jobs through the spin-out of technology-based firms. A high priority of the State of Hawaii should be to enourage in every way the involvement of faculty in commercial ventures, and it should actively help them get started.

### Venture Capital and the Commercial Development of University Technology

Many governments see venture capital activity as a key player in their efforts to develop new technology-based enterprises. This fascination stems in part from the apparent success of the venture capital industry in certain areas of the U.S. (particularly Silicon Valley and Massachusetts) in spawing hundreds of new companies with innovative products of high market demand. Some even credit the U.S. venture capital industry with a resurgence of U.S. technological leadership. Virtually all western European countries, Canada, and many "technologically disadvantaged" U.S. states are seeking to copy this phenomenon. In many cases, there are not apparent viable alternatives to venture capital-backed, technology-based enterprises to allow these countries or states to participate in the commercial benefits of the current technological revolutions. In the case of Hawaii, and particularly Maui County, the siting of "branch plants' and the extension of government programs may add to the technology employment base but the competition for such facilities is fierce, and the probability of large scale success is not high. The creation of "home grown" firms based on the commercial development of innovation is clearly a desirable goal, and one well within the grasp of the State of Hawaii and the County of Maui.

Two key ingredients appear necessary to accomplish this goal:

- An environment of tax, legal, regulatory, and political policies that encourages and rewards the placement of capital in high risk equity situations, where capital gain (as opposed to interest or dividends) is the only anticipated reward. These policies can be directly influenced by various levels of government.

- A flow of high quality investment opportunities based on the commercial exploitation of innovation. This "deal flow" can only be indirectly influenced by governments.

Accordingly we need policies to encourage this kind of capital formation, and a high quality "deal flow" based on technological innovation. As a member state of the U.S.A., Hawaii is fortunate to have ready access to the largest and most sophisticated capital market in the world. Certain local statutes, however, have been widely reported as detrimental to the investment climate in the State, and until these are removed, Hawaii will continue to experience the negative effects of the open U.S. capital market, while being short-changed on the positive effects. Capital can leave Hawaii for investment opportunities on the mainland and attempts to place barriers to this will be struck down as unconstitutional. Inhibition of capital flows to the State by an inhospitable business climate, however, ensures that new investment will focus on opportunities most immune from the negative effects of restrictive statutes. Hence large amounts of money are available for conventional real estate development, but regulatory uncertainties, high land cost, and punitive taxation render Hawaii unattractive to manufacturing concerns relative to its competition. It is encouraging that there is a healthy debate in Hawaii these days about the "business climate," and hopefully the positive signs of improvement will bring needed changes.

More crucial, however, is the scarcity of high quality investment opportunities, based on innovation development, that can become new firms employing your best and your brightest graduates. While efforts to attract outside companies to site facilities in Maui County should be pursued vigorously, the potential role of the University of Hawaii in generating the flow of entrepreneurs with ideas is fundamental. Seen from this perspective, the following policies should be adopted by the State and the University:

- Faculty should be encouraged in every way to seek close association with industry, to expose them to business ideas and market discipline, and to ensure that they are current in their areas of expertise. The reward system of the University should be changed to ensure that faculty are encouraged, rather than penalized for such associations. Also, the State must re-arrange its relationship to the University so that consulting arraangements and other university/industry associations are seen not as a conflict of interest, but as a social benefit.
- The University should pursue and defend a patent policy that encourages entrepreneurship and the commercial exploitation of ideas. In this regard, faculty should receive assignment of patents stemming from their research, with the University and/or State claiming only a token royalty, if any. Of course, if special University assistance is sought in patenting, etc., then special arrangements can be made. It is vital, however, that faculty be encouraged to follow the commercial route of company formation rather than the academic route of publication for commercially valuable research. Nothing will focus entrepreneurial faculty on this aim more effectively than the opportunity to make money!

- Finally, as it is a fundamental State policy to spread the benefits of economic development throughout the Islands, it is vital that more university facilities be placed off Oahu so that resident expertise will be developed in the other Counties. Maui County has unique advantages that should be examined to choose activities that could be concentrated here.

**Conclusions**

Venture capital financing is essentially a passive process. If regulatory and economic conditions are right, and if a flow of interesting investment opportunities is available, then venture capital activity follows naturally. With this activity comes new companies, new wealth, and new jobs. Maui County has access to the ingredients to enjoy the benefits of a diversified economy based on new technology, and the intense activity to attract new industry from elsewhere is a postive step. Whether or not these efforts are successful, however, the development of a significant County research and graduate education base through the University of Hawaii should be pursued aggressively. Given appropriate policies to encourage entrepreneurship in the faculty, new commercial opportunities will appear regularly. Venture capital will follow.

## CALIFORNIA'S COMMUNITY COLLEGE ROLE

**Dr. Rudy Melone, Superintendent-President**
**Gavilan Joint Community College District, Gilroy, California**

Gavilan College in Gilroy is almost exactly like Maui Community College in many respects. First of all, we are small. we serve a limited number of students, compared to other institutions, with about 3,000 students. At the same time we serve a geographical area that is extremely small and diverse. It is very difficult to provide true access and equity for our students.

We serve, in the Gavilan District, 2,700 square miles in a long, narrow district that ranges from north to south with an driving time of between an hour and a half to two hours. Our populations are diversely located in three major population centers and, as a result of that, we do have to try to reach out to our people in very different and unusual kinds of ways.

Our second point of similarity is that we serve what has been primarily agricultural communities. It is a very difficult and complex role that we face as we seek diversity and job opportunities for a wide, large number of unemployed persons. As agriculture in our community diminished, what has taken place is that many of the formerly migrant workers have remained behind, have established families and, as a result, need skilled learning and opportunities for education. *Now* we look to our land developers, our industrial park developers and our R & T Park developers as our main source of jobs.

Another similarity we have with Maui is that we sit on the frontiers of high tech and telecommunications. These can be of great service because of the nature of our institutions as well as their locations.

While you on Maui look toward the fact that you are in the middle of a potential for international business and relationships in the Pacific Basin Gavilan is rapidly becoming South Silicon Valley, located as it is just below San Jose.

Our concern, mine and Alma Cooper's at MCC, is: How can we get our institutions ready now to meet the pressures of what will surely come within the next few years? How can we be prepared in unique, interesting networks and partnerships? Your effort in this meeting to solve that problem earns you a strong commendation. The way you are getting the University to look at its policies and the Community College to look for the freedoms that will let it do the things that community colleges can, should and must do is commendable.

One of the considerations that Dr. Naya touched on is perhaps the most critical of all. That is, unless we do develop jobs in our communities and prepare people for those jobs, our people will leave us. We will have a brain drain. We are

experiencing that in the Gilroy area and, right now. Most of the young people who complete their education at Gavilan College are leaving the district because there are not enough suitable jobs. This includes many older woman and re-trained people who have returned to school to continue their education. The force of circumstance is such that 87 percent of the population of the northern-most portion of the district must leave their communities for work. In Gilroy, 42 percent must drive outside the community for employment. This is a major concern for us because it can lead to people leaving the community altogether.

We have another problem. In California the 106 community colleges are feeling very constrained and chafed because of the loss of community control that results from increased state funding. The determination of funding is at the state level. I sense that the community colleges are feeling fettered by existing policies and need to be freed from the constraints so that they can do more creative activities.

We all have to define our missions. Dr. Simone said that the mission of the University is teaching and research. That is a very forceful and true fact. Research, as we know, leads to the creation of new technologies, new manufacturing skills, and to the development of new products and processes.

As we talk of high technology, we are talking about another level, a more sophisticated level, of these types of activity. Our challenge is, How are the community colleges going to bring themselves into that process? Rather than wait for it, we must become the initiators, the creators, the catalysts. We must be the ones who actually create the networks and become the linking pins, not only between us and industry but between us, industry, the universities, the high schools and state and local governments.

At Gavilan we have created an organization called the Gavilan Alliance for Training and Education (GATE). This is a group of learning organizations including occupational programs that work with high schools in developing opportunities. We brought this group together three years ago so that we could work together rather than compete for funds. We work to clarify what each member's specific role is, can and should be, in relation to the educational needs in our area.

We have been very fortunate to be involved in the Los Alamos Technology Park in Gilroy being developed by Joel Smolen who is involved in your activities here. My working relationships with Joel excite me in your behalf. The man does have fantasies and the most valuable thing about him is that he makes them become realities. He does that well! He is enlightened, he is thoughtful, he's futuristic, and he's urging those organizations that come into his park to create the closest working relationship with Gavilan College that they possibly can. This helps us shape our curriculum to meet their needs by the time their facilities are built and their employment needs become known. It also gives the local people, trained in our institution, the best shot at those jobs.

Everything in the Los Alamos Park is planned ahead, for telecommunications, for computer relationships, to facilitate the networks we create. I can foresee that Gavilan College will be telecasting courses into that park site. People will not need to go to the campus but can learn right on the job through release time at work.

We have also been able to work with another organization new to our community, the Wiltron Corporation. This company needed a very sophisticated microwave measurement course, an expensive course to create and one that would not attract a large number of students. We developed a proposal that required a two-year commitment by Wiltron for teacher salary. The equipment which would be required is also very expensive so the company allowed the course to be taught in their own laboratory which means the students are learning on the actual equipment they will be using in their jobs.

One of the large grocery chains in our area wanted to expand by buying another grocery chain. The needed to develop top management talent in order to be able to do that. We sat down with them and developed actual curriculum designs for their own mid-management people so they could learn how to become managers of the future operations. All of this was at the chain's expense.

## PERSPECTIVE OF THE BUSINESS COMMUNITY CONCERNING ACADEMIC AND RESEARCH SUPPORT NEEDS

**A Panel Moderated by:**
**Dr. Paul Yuen**
**Dean, College of Engineering**
**University of Hawaii**

**Dr. Yuen:** Thus far today, we have been attempting to identify the ingredients necessary for a successful partnership between the Maui business community and the Hawaii economic and research community. Our goal is a plan of action for Maui. Thus far, we have heard about Maui's outlook and Maui's need for economic development.

Representatives from the University of Hawaii system have told us about the University and what it can offer. We have listened to comments from representatives of the state, and several experienced people have discussed the important components of a successful business, economic and academic partnership. We have also heard examples of successful partnerships.

We now conclude this part of the agenda by listening to the views of representatives of the business community and what they feel is needed to further economic development on Maui. There will be five speakers who will give their views on five important segments of the total community.

The first speaker is Joel Smolen, founder and president of Arroyo Development Corporation since its inception in 1982. As you may know, Arroyo Development Corporation is the firm that's developing Maui's R and T Park in Kihei.

Mr. Smolen has had more than 20 years of experience in the high technology business in northern California, including the development of the Amtec Corporation which grew under his leadership to a $30 million corporation.

Mr. Smolen has also purchased, developed and sold industrial properties in the San Francisco Bay Area, consisting of more than 2 million feet of industrial research and technology facilities and an R and T Park of more than 250 acres. He has a lot of experience in his field.

Mr. Smolen is a person who turns fantasies into realities, and he will present his views as the developer of the research park.

# VIEWS OF A DEVELOPER OF RESEARCH AND TECHNOLOGY PARKS

**Joel R. Smolen**
**President, Arroyo Development Corporation**
**Gilroy, California**

The role of the developer is frequently misunderstood. The developer creates a micro-climate, the cocoon or envelope for the Research and Technology Park . The occupants or tenants must find this environment satisfactory for the creative type endeavors they engage in.

The developer provides, to list only a few items, an enhanced working environment which includes extensive landscaping, open spaces, "themescapes," par courses, support services, data and communication capability, proper lotting sizes, strict design quidelines and protective covenants which insure long-term protection for park tenants and surrounding environment.

Occupants of a Research and Technology Park requires not only the support services of the developer but also need many things from the community in order for the Research and Technology Park to be successful. The primary need from the community is a trained and motivated labor pool or the capability to train people in a short time-frame. For many companies this is the first question asked of the community colleges, the universities and elected officials before selecting a site. It is also, in my experience, the first question asked of the developer.

The Research and Technology Park employer needs extensive local support at the community college level and the university level to insure a successful project that will motivate firms to locate in the islands. At least 50 percent of the jobs in a Research and Technology Park can be expected to be filled at the community college level; 25 percent at the university level and 25 percent at the high school graduate level, or retrainable to that level.

Typical Research and Technology Park occupants bring with them as few employees from outside of the immediate area as possible because of the tremendous cost of moving employees and the significant probability that many do not stay once moved. This creates a natural need for the employer to utilize every available trained or trainable local person as possible. This fact will provide an opportunity for Hawaii's university graduates to return home to challenging job opportunities and will also provide hope and opportunities for future community college and university graduates.

The colleges need to be responsive to the challenging and many times unique demands that will be put on them for trained personnel. These requirements are usually not specifically defined because of the many and varied potential occupants of a Research and Technology Park. A R & T Park will require, to name just a few: chemists, computer programmers, biologists, physicists, lab technicians, business

managers, statistical analysts, computer competent and trained clerical staff, machinists and mechanics trained to maintain new and exotic equipment. The list is long and varied. The challenges of providing the flexibility to be responsive in these areas will be great. The job formation of the future is in the hands of the colleges and the universities as well as the occupants of the Research and Technology Park.

The Research and Technology Park offers an opportunity for the university to establish and enhance their classroom activity with hands-on experience for their students and significant opportunity for their staff to consult, to interact and create new and exciting partnerships with the Research and Technology Park occupants. It will be a real challenge to create a successful R & T Park on Maui. However, the results will be seen immediately as job formation of this type will change and the challenge the community and university as it responds to these new and intensive demands.

The developer will bring potential occupants of the R & T park to your doorstep. The developer is the catalyst betweeen the academic world and the park occupant. He will be prepared to spend time and his financial resources to aid the process of creating a partnership between both worlds. It is the job of the educational establishment to not only be positive about this partnership but to put into action the programs necessary to help the Research and Technology Park occupant with his needs. The park developer will help facilitate these activities but the desire must be there and the capability to be flexible and creative must come from all of you in order to be competitive in this modern world.

The developer of a Research and Technology Park needs your help in order to insure the success of this new and exciting frontier for the State of Hawaii and the Island of Maui.Thank you very much for allowing me to share my concept of the role of the developer and the micro-climate he is privileged to create for all concerned.

## SUGGESTIONS FOR RESEARCH & DEVELOPMENT VENTURES ON MAUI

**Dr. Michael Dowe**
**Senior Vice President, Titan Systems**

**Dr. Yuen:** Our next speaker is Dr. Michael Dowe, Senior Vice President of Titan Systems. Titan Systems is located in La Jolla, California and is four years old with already $140 million worth of sales. It is the fastest growing high technology firm in the U.S.

Dr. Dowe has been the senior executive for several high technology companies. He has served as manager for the Department of Defense of several major programs, including a number of university and industry research programs, and as the program manager of AMOS, which is the Air Force Maui Optical Station located on Haleakala.

**Dr Dowe:** I shall attempt to suggest in about eight minutes how to attract industry to Maui. This would be a bit difficult were it not for the rather lucid discussions of Dr. Cantlon and Dr. St. John. Their eloquence allows me to omit repeating a lot of the basic points and to try to present an individual opinion in the form of a scenario that could be an example of what might work here on Maui. I emphasize this is strictly my own opinion of one such example.

In terms of the three objectives that we've heard repeatedly (i.e., building a stable, diversified economy on Maui, attracting industry, and strengthening the University in its participation in Maui's future), there are some opportunities that are particularly unique right at this point in time. However, first let me state that your strengths in agriculture and tourism should of course continue to be emphasized.

To bolster the agricultural economy here involves support in the bio-tech field in the University and a push to get the agricultural research station reopened. In tourism, four-year schools are needed so that the Hawaiian citizens can themselves man the tourism industry. Perhaps industrial support of scholarship programs to the mainland would help. However, these clearly needed efforts do not get down to the root of what my scenario is going to address, which is: how you can attract high tech industry to Maui. I feel that to do that and to do it in a major, significant way you not only need an "Institute" with an appropriate action-oriented charter, but you need an Institute with a theme and a direction that can provide focus and create national and even international attention. How then would one go about establishing such an Institute on Maui?

First, let me offer a bit of a historical perspective. The genesis of high-tech industry as we know it today was World War II. We saw in the forties and fifties the emergence of the AEC National Laboratories. High-tech industry evolved around their locations. MIT with Lincoln Lab and others seeded the vast research and development industrial complex around Route 128 in the Boston Area. In California,

APL at CalTech spawned Aero-Jet and supported the growth of TRW. The aerospace industry was similarly spawned. In the sixties and seventies, things began to take a slightly different turn. The government set up a number of federal contract research centers (FCRC's or not-for-profits) for which they legislated funding ceilings. These served as centers of excellence to support the coordination of industrial growth—IDA, BMI, Mitre, Aerospace Corporation, Rand were a few of this type of organization. Almost as a complement to these federally funded centers, the universities began to set up what were called "nonprofits". These university institutes are exactly the kind of thing we have been talking about here today. The Stanford Research Institute and its nearby aerospace industries spawned Silicon Valley; the University of Alabama and its Research Institute, the industrial space park at Huntsville; and the Universities of North Carolina, North Carolina State and Duke, the Research Triangle Park. Five ARPA (Advanced Research Projects Agency of the Department of Defense) university research inter-disciplinary institutes were set up in the sixties, all leading to collateral industrial development. These are just a few examples of university and university-associated research institutes that became very successful.

How does one best capitalize on this kind of format today? There are two things you don't do: go after an area that is kind of over-the-hill or one where the field is already saturated, such as a big opportunity advertised today by NASA for a space commercial development program, a field that I consider already overly populated. Similarly, another area that's really exciting is the next generation computers, but MCC in Texas has this locked up from an institute perspective.

So where can you (Maui) go that somebody's not already there and that fits this island and this environment?

Well, my choice today would be a university consortia program that would address the opportunity that was alluded to earlier by Colonel Carter: the President's Stategic Defense Initiative Office(SDIO). This office is today setting up a whole group of university consortia. They have several groups of universities already forming to compete for a university consortia: one in plasma physics; one in computing; one in pulse power; one in space platform technology; but, amazingly enough, they don't yet have one—at least as of a couple of weeks ago—in the technology that's peculiar here to Maui today and that's optical sciences. What would such a consortium consist of? You might consider forming such a consortium of the leading universities in the optical sciences field, for example, the University of Rochester and the University of Arizona - both major optical science centers. You could then have a three-legged stool which is a lot more stable than the one-legged stool you now have with one university.

Why on Maui? First, Maui already has AMOS at Haleakala. There is also a SDIO interest—with a $35 billion program over the next five years—in addition to AMOS. SDIO is a new, exciting initiative. There is also a continuing interest on the part of DARPA (ARPA's name today) and the Air Force Space Division in the evolution of optical surveillance vis-a-vis AMOS. Maui is one of the key sites for defense optical sciences field experimentation.

The related area of ocean surveillance (including optical surveillance of the ocean) alluded to by Colonel Carter involves the biggest Service client in the Islands, i.e., the Navy CINC-PAC headquarters based on Oahu; the Navy has great interest in ocean surveillance and the relevant optical technology.

A second reason for locating on Maui is that surveillance is a clean research. A third reason for the Maui location is that any classified national security research conducted by an institute on Maui would be appropriately separated from the Manoa campus of the University of Hawaii, in Honolulu.

From the university perspective, there are even more reasons for a location on Maui. It would be attractive to the students and faculty; it would raise the University's image, both locally and nationally, and it would generate research funds for graduate students and augment faculty salaries through consulting. Usually all university faculties find these aspects positive. The naval application is attractive to your major local Service client and the timing happens to be coincidental with the SDIO program which is forming right now. Further, the risk is minimal. We've heard about risks: "Suppose it goes away? Suppose there's an arms treaty?" If as a part of the negotiations one would eliminate the strategic defense initiative or reduces its scope (which I don't believe is going to happen) the importance of optical surveillance as a technology increases even further.

In conclusion, there are several variations on this kind of a scenario that I might cite, including one that would go toward oceanography. However, time dosen't permit. I firmly believe that the pursuit and evolution of this type of center on Maui could make Maui a center that would truly attract high technology and attract it in a way that serves the citizens of Maui, the University and our nation as a whole. I would be most anxious to open a Titan Office here, if such an Institute should become a reality.

Thank you.

## VIEWS OF CURRENT MAUI BUSINESS

**Arden Henderson, President**
**Maui Electric Company**

My remarks will reflect a personal perspective from the management of an old established Maui company which has had to deal with rapidly changing job requirements to keep pace with growth and new technology. I will also cover observations and experiences of other Maui companies relating to training and educational needs.

Maui has a long history of successful survival in a climate of often changing industrial bases. From the time of the disappearance of the whaling industry when the economy shifted to agricultural development of sugar and pineapple industries to the present strong development of tourism, Maui has faced a continual need to learn new skills in order to compete with worldwide markets. Maui has done this very well as evidenced by local sugar and pineapple industries that are recognized as being among the most efficient operations in the world. The visitor industry as also proved its ability to attract ever increasing numbers of visitors away from areas where many times as much advertising money is spent. The role of education has been a key element to this success.

Because Maui is a relatively small and isolated island community, it has necessarily depended on expertise often located many miles away. This generally meant that business management had to choose from among the following alternatives to maintain an adequately trained work force.

1. Hire people from other places who have the necessary skills as employees to do the work.

2. Send employees off island to be trained.

3. Hire experts from other places to train employees.

4. Develop in-house capabilities to teach employees.

5. Establish teaching institutions on Maui with capabilities to train local residents to do the work.

In choosing among these alternatives, managers would balance quality of training against the cost. Often there was little choice other than sending people off island to be trained or importing expertise from far away. Both choices were expensive and time consuming.

Fortunately, for existing businesses as well as new industries, this situation has changed. As the economic base grew with more businesses, jobs and people, there

are now quality teaching facilities on Maui and several others available which can be brought here for special purposes at reasonable cost on short notice.

The most visible of these facilities is Maui Community College handily located in Kahului. Other speakers have made reference to the College and some of the programs available. There are several training consultants from Honolulu and the mainland who are happy to come to Maui at reasonable cost when companies can ensure adequate attendance.

Through cooperative efforts of the business community, it has been possible to bring special programs to Maui to meet unique educational needs. The Maui Chamber of Commerce coordinates this activity on a regular basis. The Chamber also provides special training and guidance assistance to Maui's existing businesses through the Small Business Administration, the Service Core of Retired Executives and the Active Core of Executives (SCORE/ACE). All of these sources contribute to the solution of Maui's educational needs. However, the major contribution toward higher education on Maui has and is happening through the University system and in particular the Maui Community College which is the local arm of the University.

I've been impressed with the successful efforts of the College to provide for the specific educational needs of its community. This is what its name implies and is one of its stated goals. Often this need was greatest in areas of developing basic vocational skills. Our company has benefited by special programs provided by the College such as welding, supervisory training, drafting and word processing. The College has been responsive to special educational needs as they have arisen by providing an expanded curriculum to satisfy requirements for their two-year degree and certificate programs. Reflecting the response to local needs of Maui's major industries, certificate programs are offered in agriculture, hotel operations, food services, apparel design, general office training and human services. In response to needs in the community service areas, certificate programs are provided for subjects such as criminal justice and nursing.

Over the past few years, the existing Maui industries have been invaded by the exciting world of computers along with the rest of the nation. Most of the activities of sugar, pineapple, tourism, travel, utility, retail and government industries on Maui are controlled, scheduled and monitored by computers. Thesecomputers are programmed and operated by many employees who had little or no experience with such equipment until five or ten years ago. Many of these employees who now skillfully operate this equipment learned these skills on Maui in much the same way they learned basic vocational skills of carpentry, welding, farming and hotel operations in earlier times.

As the community need developed, the educational system responded to the need. A look at the MCC 1985 Fall Schedule of Classes reveals that thirteen different computer courses will be available. Visits to the College's computer center periodically over the past five years have impressed me with the growing installations of quality equipment along with the addition to faculty of knowledgeable teachers. Several of our company employees along with those

from other Maui companies have filled their classes resulting in more classes being opened to meet the demand. With each semester, we see improved facilities and stronger faculties.

State support toward these efforts is obvious as evidenced by the enthusiastic participation in this conference by the University and the governor's administration. Participation here by the county mayor, county council, the governor's administration and state legislators gives evidence of sincere government support.

The strong entry into telecommunications by MCC warrants optimism for their concern and abilities to successfully cope with the needs for expanding technology of the future.

Based on the strong track record of the Maui community in meeting the educational needs as they arise through the cooperative efforts of business, government and the state's educational infrastructure, I firmly believe the high technology companies who come to Maui will become as convinced as I am that quality higher education will grow in direct proportion to the needs. Whether these needs are in the form of education in computers, scientific research, telecommunications, financial analysis or combinations of all, cooperative efforts and hard work will bring solutions to our needs for higher education.

## INCENTIVES FOR CREATIVITY

**Dr. Ben Bohlool, Director**
**NifTAL Project, University of Hawaii, Maui**

As University professors and researchers, we are instilled with the idea that the University is the citadel of higher education, the center for the promotion of excellence, the venue for creativity. But sooner or later, we are faced with the question of: Where is the incentive? Where are the rewards? As Dr. John Cantlon pointed out earlier, we are faced not with the question of "Where's the beef?" but, rather, "Where's the gravy?"

It is a common notion at the University that a poor scientist is a creative scientist. Keep him poor, at the threshold of subsistence, and he will produce and create and not complain too much. For too long creative scientists have taken President John F. Kennedy's advice literally in not asking what the University or society can do for you, but what we can do for society.

For a University scientist to aspire to share in the wealth he has two routes. One is through the never-never land of administration and the other is to go out and become an independent entrepreneur.

In the ten years I have been at the University, every time I came up with a creative idea it cost me at least a weekend. Every time I had a good idea at a faculty meeting, I was charged by the chairman to write a position paper. When I presented my ideas—scientific or technical—I was advised to write grant proposals or contract proposals.

Now I'm on the receiving end. When the scientists at the NifTAL Project approach me with innovative ideas for international development in Africa, I say: "Fantastic, why don't we do it?" The response is: "I'm already burdened with enough. I'm doing more than what I am being paid for. Where's the gravy?" The question may seem mercenary, but it is a real question that most University faculty members face sooner or later. The vehicles for exploring commercial avenues are closed.

Dr. Cantlon pointed out that at Michigan State University, one of the pioneers in this area, some of these hurdles are overcome and new avenues are being provided for exploration and investment.

Before I present one example of the kinds of activity that are possible, I want to describe the NifTAL Project. NifTAL is the result of a contract between the University of Hawaii and the Agency for International Development (AID) which started in 1975. It is a multifaceted endeavor with all activities directed at international agricultural development for less developed countries in the tropics.

NifTAL is headquartered in the old Maui High School on the lower slopes of Haleakala on Maui's north shore. We have an office and laboratory facilities in Bangkok, Thailand known as the Resource Center for South and Southeast Asia. It provides expertise and knowledge of the state-of-the-art in nitrogen fixation. We have a full-time scientist stationed in Zambia, Africa through a contract from the University of Illinois. The total project employs about 30 people, nine of whom are Ph. D.'s with most of the rest holding masters and bachelors degrees. While we are operationally located on Maui, responsibility for the contract is with the Hawaii Institute for Tropical Agriculture and Human Resources on the Manoa Campus.

The NifTAL Project and its activities are divided into three major areas:

1. Education and training

2. Research, as related to problems of international development

3. Outreach, with a very heavy emphasis on delivering our services to less-developed countries in the Tropics

There is very real potential for commercialization in many of these activities. Education is a marketable commodity and we give it away to developing countries for a good cause. I'm not suggesting that we should not give it away to developing countries, but it should be recognized as a marketable commodity for the developed world.

Our research can and should be marketed. The type of research that we conduct has great potential not only in development but also for contract research. By marketing and commercializing the expertise at the NifTAL Project on Maui we can make it available worldwide and at the same time profit the Maui economy, which benefits all involved. One example of the potential: We have been approached by a firm in Turkey asking us to help establish an inoculum production facility in their country. This could serve as a test case for the beginning of a commercial venture for NifTAL. However, presently no effective models are available at the University to allow us to move ahead.

As stated earlier, our scientists are already underpaid and overburdened; they need alternative incentives in terms of personal benefits to encourage their creative instincts and achievements.

We have been charged by the organizers of this symposium to come up with specific recommendations. Mine would be: (1) That the University institute a center for tropical agricultural bio-technology on Maui, and (2) that the State buy into Maui's Research and Technology Park, to allow projects such as NifTAL to commercialize their expertise and their products.

## ACADEMIC FREEDOM AND THE BUSINESS PARTNERSHIP

**Dr. David Ramsour**
**Chief Economist and Vice President**
**Bank of Hawaii**

When we look at the economic impact of a University in a community, we more often than not are struck by how dissimilar that impact tends to be from one location to another. Different universities have different kinds of influence in their communities. In view of the likelihood that the subject matter that different universities are capable of dealing with does not change from institution to institution, I am led to believe that the issue of impact is only distantly related to academic topics.

The key issue, then, must be one of attitudes held by the faculty and administration and by the business community and the public.

My present feeling in observing Hawaii's relationship with its institutions of higher learning—and the University of Hawaii in particular—is that the stand-off we see between the commercial world and the University is only the tip of the iceberg. A political legacy of territorial attitudes and the philosophy of the Big Five often seems to be one of managing a supposedly apolitical institution of education as an important instrument of government policy.

It is not usually possible for a university to be entirely free of political ties and pressures, but it appears to me that where that freedom is encouraged to its greatest practical limits, the institution has been able to perform in its most creative and productive fashion. Besides extensive degrees of autonomy from external government control, this has tended to mean fairly great degrees of freedom internally for faculty to establish varying forms of collaboration with applied or economically productive projects.

The attitude of the university's controlling community or power base determines the direction of that university, determines the freedom or restraint brought to bear on the translation of academic disciplines into applied practices. That controlling community can be a religious order. It can be a militant Harlem. It can be a commercially powerful alumni organization—or it can be a partisan legislature. In a negative sense, it can be a disinterested business community or a disinterested community meant to be served by the university.

If a university is expected to produce religious leaders, it tends to do so. If an alumni association expects to see strong athletic production, it tends to have a direct impact on a school's athletic excellence. If a school is expected to be a leader in the community in social development, it tends to be so. If it is expected to be a breeding ground for political and legislative leadership, it tends to become that.

In my view, the two groups that have shaped our institutions of higher learning have been a legislature and a relatively disinterested business community. Some have described it as an interventionist legislature. A business community that is only moderately interested does not provide much hope for autonomy.

My belief is that if the institution is not encouraged or expected—internally or externally—to contribute to practical corporate activity, no amount of scientific or management research will help the institution satisfactorily impact the commercial facet of society. It may satisfy other basic goals that the community is expecting of that institution, but it won't satisfy much in the area of commercial and economic needs. Certainly the economy feels the consequences of graduates trained with a BBA or an MBA or a science degree, but for those benefits the university could just as well be in another state.

How does a local institution acquire more of an impact on the economy, one that extends beyond producing employable people, beyond producing politically active graduates or socially conscious or religiously committed graduates? Above all, how do we move an institution of higher learning toward one that begins to immediately impact and contribute to the way we design and produce our economic goods and services? Obviously, I would return to that very word that Al Simone used this morning: *attitude*. Attitude is probably far more critical than dollars or talent or faculty. Both the administration and the legislature in our environment here need to be willing to let go or let loose the research and educational units of the institutions of higher learning to direct their own courses and eventually move their conceptual centers of gravity—and perhaps their geographic centers as well—to where the related problems need solving. This may mean splitting the programs to geographically different locations.

Art Henderson mentioned that commercial institutions are having to resort to internal training programs. I think this is going to be increasingly the case unless the universities are capable of responding. I think if the universities are not able to do so, they will ultimately become monuments to irrelevance.

The universities of the future, as I see it, are going to be as unrecognizable as perhaps a set of encyclopedias will be at the end of this century, only fifteen years from now. My view of the future is not only that encyclopedias will be available in my handheld computer, but the entire libraries of the Manoa campus, the City of New York and Congress will be available in my handheld computer! And as I mentioned to someone this morning, I will be able in three minutes to find out what Thucydides felt were the five basic causes of the Peloponnesian War. I won't need your library. I may even be able to get five of the latest taped lectures on research in nematode control—and I can view them in my hand.

The question then is: *how long will the university, as we know it today, remain an intermediary between what we want to learn about and ourselves?* The university will in many ways become physically invisible in the 21st Century through technology. This will facilitate the move of much of the university into production units, be they commercial, social, medical, political.

We have talked of the university almost entirely in the framework of what we know and understand today. If the university of today is going to survive into the perhaps formless university of tomorrow, it's going to take more than the continuing nostalgia of an alumni association to keep its memory, if not its function, alive. As it regards its role in the economy, it will take some major attitudinal shifts by the academic minds and the legislature. If the legislature cannot learn to let go, I see mediocrity disguised as egalitarianism and a tool of political control disguised as an instrument of social advancement.

The attitudes of the business community must also change as radically as do the attitudes of others of whom I have spoken. The members of this community must determine in their minds that the University is going to be a top class contributor of applied technology, especially if they have anything to do about it. An institution of higher learning can't become such or can't become a problem solver unless its commercial community affirms the university in that role. The attitude can be partially implemented or acted out through various support groups, partnerships, direct investment in the University of Hawaii. But, you are going to have to help us get past our legislators in all of these areas—including president's salaries—if we are to make any progress. It will take the teamwork that other cities and states have learned but that we have yet a way to go before developing.

I see this meeting as an exciting step in this relationship.

## REPORTS OF DISCUSSION GROUP DELIBERATIONS AND RECOMMENDATIONS

**Mr. Malcolm:** Our agenda for this morning includes a report from each of the four discussion groups; following these reports some wrap-up thoughts by Al Simone and myself will wind up the meeting. I have been impressed with the fact that you all worked late last night in your discussions. We actually had to call a curfew on one or two of the groups last night.

In planning this meeting the committee felt that the discussion groups should be given a specific topic to discuss, one that was considered a feasible area in which Maui might develop new businesses—hopefully in partnership with the University. The committee selected four such topics for discussion and recommendations. In order to enhance the liklihood of obtaining *action oriented* recommendations each group was provided with a set of suggested questions relative to their assigned topic. These suggested questions are contained in the Appendix for reference. Each discussion group was co-chaired by a member of the University and a relevant professional from Maui.

The Discussion Groups and Chairs are listed below:

- **The Potential, Feasibility and Approach in Developing U.S. Defense R & T Capability on Maui**
  - Dr. Fujio Matsuda — Executive Director of the Research Corporation of the University of Hawaii and former President of the University of Hawaii
  - Dr. Jamie Chapman — Vice President U.S.Windpower and a Director on the MEDB Board
- **The Potential, Feasibility and Approach to Developing an International Center for Agricultural Research, Training, and Technological Transfer on Maui**
  - Dr.William Monahan — President, Controlled Environment Farming, MEDB Panel Chairman
  - Dr. Chauncey Ching — Professor & Chairman College of Tropical Agriculture and Human Resources
- **The Potential, Feasibility and Approach to Developing a Strong Private Sector R & T Capability on Maui**
  - Dr. John Decker — President, Kuau Technology, Ltd. MEDB Education Coordinator
  - Dr. David Yount — Acting Assistant Vice President for Academic Affairs, U. of H.

- **Defining a Role for Maui in International Economic Development, R & T and Technological Transfer Activities**
  - Mr. James Worley — Principal Broker, Pali Kai Inc. Realtors, Chair of MEDB Panel
  - Dr. Patrick Takahashi — Director, Hawaii Natural Energy Institute, University of Hawaii

Now I should like to call on the cochairs of the discussion groups for their reports and recommendations. First, let us hear from the group that looked into the "Potential Feasibility and Approach to Developing a U.S. Department of Defense R & T Capability on Maui," Dr. Fujio Matsuda and Dr. Jamie Chapman.

**Report of Discussion Group**
**on**
**The Potential Feasibility and Approach to Developing**
**U.S. Dept. of Defense R & T Capability on Maui**

**Chaired by Dr. Fujio Matsuda and Dr. Jamie Chapman**

**Dr. Matsuda:** Before I go ahead I do want to thank the members of the group and especially Jamie. He conducted the meetings so that while seemingly discussion went all over the place, it came out just right at the end. Jamie did a great job. We had about four hours of very stimulating and vigorous discussions.

I don't think I could possibly trace for you all of the convoluted discussions that we went through. I will list the conclusions and recommendations that the committee has reached. Let me assure you that the discussions were very broad.

There was great, good participation and for those of us who have not been particularly involved in defense-related research, the presence on the panel of several people who have a great deal of expertise in defense R & D contributed very much to our understanding and to the results that we have come up with.

We zeroed in on a few concise actionable recommendations to the Maui Economic Development Board.

1. The committee agreed that the Maui Economic Development Board, with the support of the Maui community, should recommend to the University of Hawaii to establish on Maui a research institute to conduct both commercial as well as federal government sponsored or funded high tech research, which are appropriate to Maui and its environment.

   Examples of the kinds of research appropriate to Maui and with a high potential for success are in the areas of optical research, related to the astronomy facility of Haleakala, and ocean related research, both of which are also programs of excellence at the University of Hawaii. These areas are compatible with other classified research being conducted on Haleakala.

2. We recommend to the University that they explore the formation of consortia with other universities and centers of excellence in research in developing the research institute.

   The consensus was that by broadening its scientific base the chances of success in this venture would be magnified. The University should proceed to identify potential partners in this research effort, form a joint venture or consortium, and then approach potential clients for appropriate research projects.

3. We recommend that the University encourage Maui Community College to develop high technology related programs, continuing education programs, and specific job training programs.

4. The University and the Maui Economic Development Board should jointly engage in public information and education; explore the implications of high technology development on Maui and consider a fairly long term impact—say , at least a five-year horizon.

   There are some immediate transient effects when you start out something new, but we suggest looking beyond that and evaluating whether or not this kind of effort is going to be beneficial to the community and to the island in the long run.

5. We recommend that MEDB appoint Dr. Jamie Chapman and that the University appoint a counterpart to form a small committee to immediately pursue the feasibility of forming a consortium to approach various potential clients. In this process, the committee certainly should touch bases with the Department of Defense as well. If this effort is successful, for whatever reason, then we recommend the following:

6. We recommend that the committee continue to press this effort and to try to achieve these objectives in other ways. The formation of a consortium is one way, but not necessarily the only way. We believe that while this has the highest probability of success, there may be reasons why it may not be immediately possible to do so. If so, we should look at other ways to achieve the objective.

7. Finally, we recommend that the initial effort should be jointly funded by MEDB and the University of Hawaii. We therefore recommend that the University and MEDB share the costs.

If there are any questions, Jamie and I and members of the committee will be glad to answer them.

## Report of Discussion Group
## on
## The Potential, Feasibility and Approach to Developing an International Center for Agricultural Research, Training and Technology Transfer on Maui

**Chaired by Dr. William Monahan and Dr. Chauncey Ching**

**Dr. Monahan:** We would like to present some conceptual ideas that more or less reflect the consensus of the discussion group concerning what the issues are. We have also raised a number of issues for which we have no answers at this time. However, we want to mention these to indicate that these are problems that need to be solved. So at this time we shall present both a broad overview of the challenge in front of us and a recommendation to proceed. Someone then will have to take the ideas and turn them into more concrete recommendations. Chauncy Ching will outline our discussion and recommendations.

**Dr. Ching:** First, I want to thank those who went through these discussions with us. Both Bill and I weren't sure what we were going to do with the three and a half hours alloted for these discussions. We thought we'd sit and look at each other for that period of time. But, as it turned out, we even carried on after the scheduled closedown last night.

Procedurally, we formed two sub-groups and set about trying to develop some recommendations. In one of the groups, we talked about some initial concepts such as: What is the product being considered in an international center for agricultural research, training and transfer of technology? We concluded that the main products were *knowledge, information, and training*.

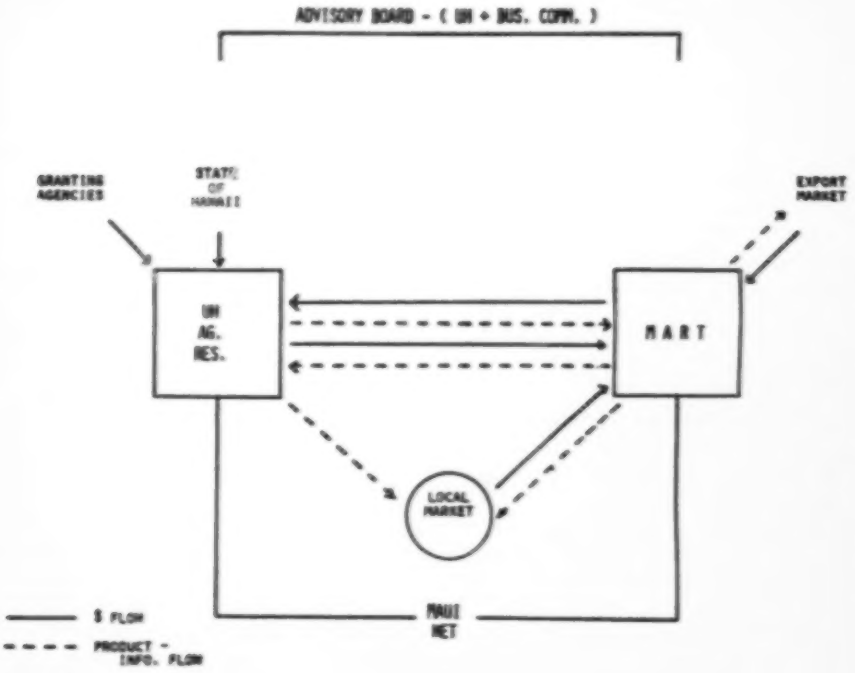
We then looked at the two potential partners - the University and the business community - and asked: What are the goals? We concluded the goals of both partners would be profit, employment, knowledge, and training.

It is suggested that some kind of a "demonstration effort" be developed which would demonstrate to the world that certain kinds of activities could be developed on Maui. This could, in turn, attract other types of activities to Maui which is perhaps where the real economic development would occur.

Lastly, these kinds of activities properly organized could also serve a brokering function to various kinds of agencies, peoples, and governments interested in various kinds of agricultural technology transfer. With such an organization, they would have one place to go to which would be very useful.

In addition such an organization would capture the relative expertise of the two partners. On the one hand, the business community which has the ability to make commercial ventures profitable; and on the other hand, the university component, which specializes in the conduct of basic and applied research as well as training.

We therefore propose for discussion an organization as shown below:




We called the organization MART, Maui Agricultuural Research and Training, as an entity. One partner to MART would be the University Agricultural Research component.

Two kinds of arrows are used to describe different types of "flows" involved. The dotted arrow indicates the flow of the product which may be viewed as knowledge and information. The University component, i.e., the University partner, would generate technology which could then be sold to MART. MART pays for the technology; hence, the solid line meaning cash flows. MART would in turn then market the technology developed which is essentially information. MART would be a private sector entity and as such would have a marketing strategy —export and local.

It was felt that the reason this type of activity should be located on Maui is that there appears to be a comparative, if not absolute, advantage due to the so-called "Maui Network." Here, in a 12-by 12-mile area, conditions that are representative of 70 percent of the the tropics exists. Thus, Maui has some natural laboratory conditions that could make this a very desirable kind of activity—and profitable.

With this general organization outlined, it was presented to the full group after which a number of issues were raised.

We have four recommendations and have identified some additional issues.

1. It is recommended that the product be carefully defined. In general, the product is agricultural technology, but has to be defined much more precisely.

2. Secondly, it is recommended that once the product is defined a comprehensive market analysis should be made. Within the University community we already believe there is a demand for this kind of activity. Telephone and mail correspondence suggest this conclusion.

   MART as an investment alternative, requires careful marketing analysis to determine saleability and profitability.

3. Thirdly, a detailed study of how this kind of organization would be put together is needed. What we have conceptualized is clearly not in final form. The ultimate organization has to be studied from several points of view.

4. Lastly—and this is an internal recommendation to the University community—we should review and identify and perhaps establish the University policies that will permit this type of partnership to be developed.

Relative to these recommendations, a number of concerns raised were: What constitutes the leadership of the organization? How will it be put together? Who will do it ? Where's the money going to come from (especially the seed money)? Does this type of organization violate the land-grant university philosophy? Is the rate of return to the investors in this venture going to be sufficiently high to justify their investment?

The question of the kind of products was raised: Are some going to be proprietary? If so, would these be exportable? Or would the organization export everything? A definition of exportable versus nonexportable products would be needed. Since the product is "knowlege" in some form, careful definitions would be required.

The issue was raised of whether the College of Tropical Agriculture (which would play a major role in the MART concept) is sufficiently of world class stature that the college faculty can actually make the necessary kinds of contributions.

It was pointed out that the name "MART" may not be entirely appropriate. The original charge to our discussion group referred to an international center. That word "international" should appear somewhere in the notion of MART, otherwise we've missed an important segment of the market.

Finally, a very basic question was raised: Should the U.H. be involved at all in this

kind of venture? What possible legislative actions would be required?

In conclusion, the general recommendation is that MART is an organizational structure which should be pursued. There is however, need for a detailed evaluation that addresses the issues and concerns raised.

**Report of Discussion Group**
**The Potential, Feasibility and Approach to Developing**
**A Strong Private Sector R & T Capability on Maui**

**Chaired by Dr. John Decker and Dr. David Yount**

**Dr. John Decker:** We are a group that consisted of the business community, the academic community, and a group of outsiders—businessmen, leaders from the Mainland. One of the things that was very impressive with our group was the unanimity of feeling. That was really quite impressive, both at last evening's analysis of the problems and this morning's brainstorming on suggestions.

Brainstorming is a pretty good description of what we did this morning. We had asked everyone to come in with a couple of written suggestions which we then simply listed. There are twenty in all, the first three being procedural—how to get started. As the process of setting priorties got under way, it became very obvious that it was not a task for our ad hoc committee.

1. As a result, first of our 20 recommendations is that priorities be set in this list of rough recommendations showing when, who does it, and how it's to be done. We further recommend that the Maui Economic Development Board develop from this list a needs statement. This statement would then be coordinated with the MCC provost, the provosts of the other community colleges (since what we are doing here is a pioneering effort for what will be needed for the rest of the Neighbor Islands), and with the U.H. president. And from that meeting, generate an action plan for the future. There was a suggestion that the action plan might include another conference, or perhaps meetings, with the legislature.

   *There was a considerable sense of urgency.* It was pointed out that Joel Smolen of Arroyo Development Corporation will be breaking ground within a few months for the Maui R & T Park. In about a year occupants in the park will need to have training programs in place. Therefore our suggestion is that *this process be completed within a year.*

2. It is suggested that the rough list—without setting priorties on it, be transmitted by Mr. Malcolm to the U.H. president and to the governor for response to this problem.

3. It was suggested that we simply present to the full group, our full list of 20-odd suggestions. We have attached priority to only two suggestions, the rest are in no particular order of priority.

4. *We recommend this suggestion be implemented immediately.* A liaison structure should be set up that would include one person from the University (preferably of Vice President rank) designated by the

University President and a Neighbor Island Advisory Committee (probably not just Maui). This should be a small group, three or four people, but should include representatives from Maui, the Big Island and Kauai, and should probably be under the aegis of MEDB. The committee and the University contact person should be charged with continuing liaison and future development in accordance with the needs statement we discussed earlier.

5. The recently passed constitutional amendment giving U.H. autonomy should be enforced.

6. The U.H. Patents and Copyrights Policy should be looked into. In fact, Brian St.John has volunteered to do so, so that's already being implemented.

7. It is suggested that the legislature pass a resolution expressing the change of attitude particularly toward U.H. staff consulting and working with business. That was discussed over and over in this conference. This is a positive, necessary thing to do in order for Hawaii to be competitive in attracting new business opportunities.

8. Similarly it was felt that the Governor should make a commitment and a statement reflecting this changed attitude—the autonomy of the University community, and that consulting is a permissible and proper thing to do. The concern for the State's "brain drain" should be included in the statement.

9. The U.H. needs to develop and implement changed policies:—for instance, to accumulate consulting days credit for long projects, to encourage leave-of-absence to consult for Hawaiian companies. But, more than that, it is vital for the University to indicate that consulting for business, for economic development has a *positive* social benefit, that it *is* a social responsibility that comes with being in the University, *that it is not a conflict of interest* ; and that it should count *positively* for promotion and tenure.

10. There is the thought that we need to modernize our thinking concerning what it means to be a land/sea-grant university, particularly in light of John Cantlon's remarks.

11. It is recommended that the business community be given more access to the resources of the University, perhaps using telecommunications techniques.

12. We recommend that there be a mechanism in place - *within a year, preferably* - for the community colleges, and specifically for MCC, to take action on business training needs; and that that requires some mechanism to achieve flexibility and speed of response and autonomy.

13. It is recommended that the University inventory its resources and inform the community of these resources, particularly the business community.

14. We recommend that an upper level BS/MS program be instituted at MCC, in certain specific targeted disciplines (the one that came up most was computer science), using outreach techniques, perhaps telecommunications, perhaps visiting faculty; *but that it be implemented as soon as possible.*

15. There is a corresponding suggestion that perhaps the University system should in the long run consider a new upper level college in the Neighbor Islands responsive to high-tech needs.

16. We recommend provisions be made for the acquisition and use of the satellite uplink for UH/business purposes; and similarly, that U.H. data bases be available at low cost for the business community.

17. We also reflected on the need for developing greater awareness of high tech in the community and its implications for Maui.

18. We suggest that the training needs of possible new businesses be anticipated by performing a "dry run" at the community college. A hypothetical company—preferably an actual one, one that has not yet committed itself to move here—would be analyzed to determine its training needs. The exercise would consist of going through the community college, with whatever mechanism set up and to see how MCC would respond. This "dry run" conducted before somebody actually walks in our door and says, "Here, train 300 people by next week." would permit MCC to better anticipate and prepare for the new business expected.

19. Other suggestions for liaison with U.H. and MEDB include: that U.H. designate specific people that the business community can work with, that an agency or at least a training fund with a quick response capability be established (what we called a Rapid Strike Force).

20. And finally, we recommend that *MEDB* study the need for an Incubator Facility or Innovation Center as a part of the R & T park, or associated with it, to focus on "growing" small businesses.

As mentioned, priorities are not noted on this list except for the first four which hopefully would get the process started. Otherwise they are listed in the order presented in the group's discussion.

**Report on Discussion Group**
**Defining Role for Maui**
**in**
**International Economic Development,**
**R & T Technology Transfer Activities**

**Chaired by Mr. James Worley and Dr. Patrick Takahashi**

**Mr. Worley:** I had the honor of co-leading the discussion group. It was a very spirited discussion, and I would like to thank all of the members for their very open comments and their frankness. Dr. Takahashi will summarize our group's discussion and recommendations.

**Dr. Takahashi:** Our group was quite lively and even had some jestful comments about Maui seceding from the state. There was also a sense of frustration in that perhaps things might not be moving as fast as they could. All that aside, there was very strong, clear consensus on two recommendations and the endorsement of a concept to develop Kapalua International Center as an academic/business venture.

1. Maui needs to complete a Master Economic and Development Plan for the County. The Plan should consider both the short term—where are current targets of opportunity, e.g., China with its current interests in economic matters—and more importantly, the long term, for what you do today will have tremendous impact into the 21st Century.

   The plan should be made so as to provide "systems integration", which would outline all the inter-related activities to avoid long term conflicts.

2. The second recommendation is to focus on local advantages. For example, Maui has a broad range of micro-climates that represent essentially most of the developing world. This feature can be used to good opportunity. The NiftAL operation on Maui, for example, can be developed into a world class bio-tech laboratory. It should be beefed up and is a short term opportunity that can start right now.

   Also the proposed Maui Renewable Resources Research Facility at the Maalaea Energy Park should be encouraged. This facility could focus on renewable resource appplications, such as using windpower for reverse osmosis, to convert brackish water to fresh water. This is a critical problem across the Pacific.

   Tied in with this research facility—really more a technology transfer facility—would be hands-on experience with equipment for technical people from other countries. As such, the Renewable Resources Research Facility would be a great training ground in which Maui Community College could take an important lead role and become the focus for Pacific-wide operations.

These were just two of a half dozen short term concepts mentioned for immediate action. At the same time, in parallel, serious planning should begin on the proposed Kapalua International Center which is a longer term concept.

The discussion group was given a one page concept paper describing an international center that could be developed on Pineapple Hill in the Kapalua complex. This was presented as a preliminary concept for discussion and is shown on the following page. The concept suggests the Kapalua site as a mid-Pac center for an assortment of activities discussed. It would not duplicate what the East/West Center is doing or what any other organization in the world might be doing; rather, it would tackle selected areas and activities of the nature mentioned throughout the past two days. Emphasis would be on private sector investment as opposed to depending on the Federal Government or the State. Other mainland universities might participate and locate some of their programs and/or staff involved in Asian consulting and training in the center.

The University of Hawaii, of course, should be an important resource - and an active partner, as a matter of fact. The Kapalua International Center should also very closely work with existing organizations, such as the Pacific International Center for High Technology Research, the East-West Center and many of these universities that are already doing things in the Pacific that might want to have a staging ground here.

Don Malcolm asked point-blankly, in Al Simone's presence, "Will the University help?" And the answer was, "Of course we will."

In conclusion, take advantage of your unique opportunities, but do it in a context of an overall master plan. Unless you really focus on what you're best at, and you act quickly, you are going to miss this opportunity.

And we are all here to help you. Thank you.

## KAPALUA INTERNATIONAL CENTER
## AT
## PINEAPPLE HILL

An Initial Concept Description

### PURPOSE

To provide a permanent mid-pacific center for the study and interchange of information, ideas, opportunities and programs concerning common problems of the Pacific Rim countries.

To develop a means for improved communications, technology transfer and education on such topics as:

- Medical & health research and technology
- Tropical agriculture and biotech research
- Population management
- Productivity and economic issues
- Management and transfer of technology
- International management training/consultation center
- Pacific Basin interdependencies

### APPROACH

Develop a 10-12 acre site with facilities for management and scientific conferences, study and research, advanced telecommunications capabilities using two way interactive video for international education and training.

Programs, international consulting and research projects to be developed by sponsoring groups.

Library and limited research laboratory space available.

### SPONSORS

Possible joint venture or consortium, of mainland universities, Asian universities and/or the University of Hawaii - training, consulting, research.

Land given or leased by Kapalua to the joint venture or consortium.

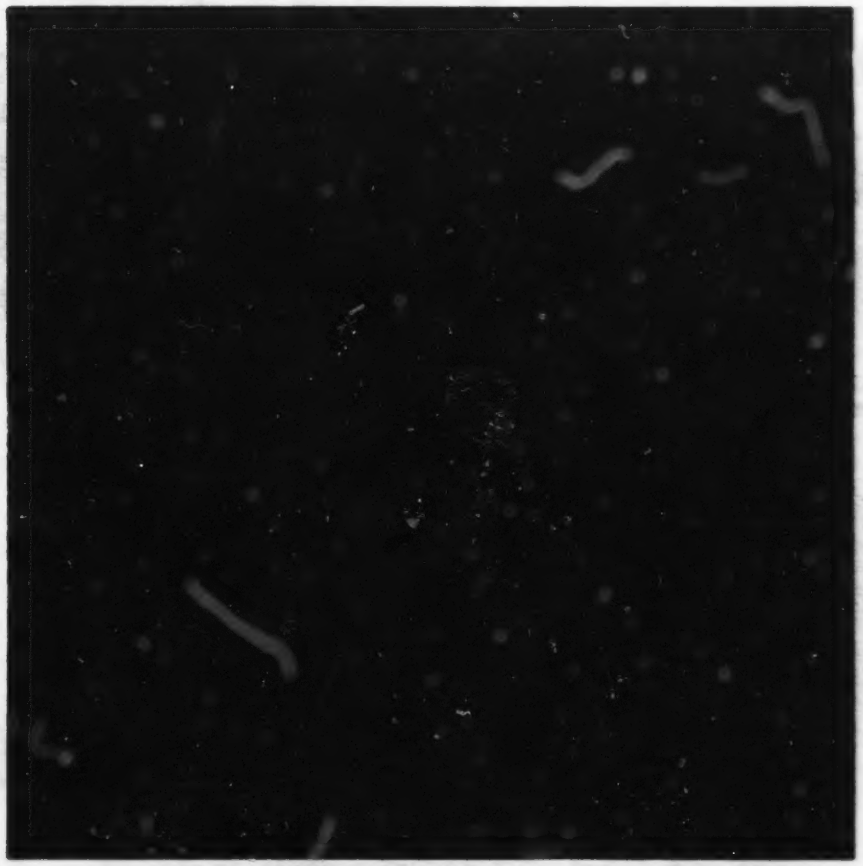
Support from major foundation for development of instruction facilities and possibly for support of faculty on special or sabbatical assignment.

Federal contract support for a few selected projects.

Conference fees, etc.

## DESCRIPTION OF SITE

The site is located atop Pineapple Hill and has a 180 degree view toward the ocean encompassing Lanai, Molokai and Honolua Bay with another 180 degree view of the West Maui mountains and the Kapalua Golf Course. The site overlooks the Kapalua Bay Hotel and is reached through a picturesque mature Norfolk Pine-bordered lane. The site is shown in the foreground in the photograph below.



## SUMMARY
## COMMENTS BY THE UNIVERSITY OF HAWAII AND MEDB

**Mr. Malcolm:** I see we made some newspaper headlines yesterday. It says: "State Planner Attacks U.H. Priorities at Maui Meeting".

I mentioned earlier to Dr. Simone that the purpose of this meeting was not in any sense of the word to roast the University. Our plan has been to show our respect and to work together. That has been the spirit of the meeting. Our strategy on Maui has always been to work within the system and to try to bring up needs and opportunities in an effective way.

We are now at the point in the program for a summary and some comments from the University. Following some comments by Dr.Simone, Colin Cameron and I will attempt to summarize for Maui business. Al, the floor is yours.

### Dr. Albert J. Simone
### President, University of Hawaii

Let me just give some conclusions, make some points and then give a quick where-do-we-go-from-here suggestion.

One obvious conclusion is that economic development in Maui and, of course, in the state as well can be substantially more successful if the University is involved and plays an active role. The University is involved to a significant degree at present but not in a concerted, planned, orchestrated way. What we have been talking about in this meeting is that by thinking about the nature of our involvement, planning for it and working together with the range of people involved, a major new kind of an involvement can be developed. If that can happen, economic development can go forward at a fast pace. To me this has been the underlying theme of this meeting.

So the question comes up: Should the University actually play a stronger role? From the point of view of the University, the answer is a loud, resounding: ***Yes!***

The justification for this answer—if one is needed—was never made better than by John Cantlon's excellent presentation of the role, function, purpose and functioning of a land grant university at the luncheon yesterday. There is no one in the country better suited to speak on that topic. John, we are all in your debt for that outstanding presentation. The word is "service" in a relevant way, and in a relevant tone. We now have the outline and much of the substance to guide us. We are in your debt.

Another question raised is: *Should* the University play a bigger role, a stronger role? The answer is: Yes! *Can* it play a stronger role? The answer has to be resoundingly: Yes!

The University has so many vehicles; we have our academic programs—teaching and research—our service programs, our continuing education programs. These programs are in place. Therefore to meet the challenge it becomes a need to expand these programs in the right ways at the right times with the right kinds of interactions, making them more effective, adding to them where we should. The academic programming that we need to provide this kind of involvement and support is there.

In addition to the academic programs, something else is needed—administrative support—not just in terms of secretaries and travel, but rather administrative support in the sense of *attitude* and *climate*. I would like to offer to you that the attitude and climate of this University and its leadership is positive. We want to be able to do more.

In addition to the academic programs and the administration's attitude, new technology is working very strongly.

Alma Cooper alluded yesterday to the $4.2 million that this year's Legislature has established to provide state-wide Instructional Telecommunications Fixed Stations, (ITFS). This concept will be implemented through KHET Public TV. It provides for two-way audio-visual interaction and is the result of a lot of work by Jim Young and Ralph Miwa. This is an example of the University and the community working together to accomplish something of major significance. This would be another vehicle that can be used to implement some of the concepts discussed in the meeting. We are committed to this program.

At the same time, we cannot forget the central purpose and function of the University. The central purpose and function of the University is to provide the best quality teaching, the best quality learning environment, the best quality research climate for students and researchers in the State. We have to take young minds, teach them how to learn, teach them the excitement of discovery, prepare them so they can teach themselves how to learn over a lifetime, prepare them to deal with life. Dealing with work is one part of that world of life. If we teach well, do research well and do it in a high quality, relevant way, with motivated students, our output will produce the kinds of support for economic development that you are asking for here.

I want to point out that we have to keep things in perspective. We are about education. And well done, it can be a tremendous boon and support to economic development. The University's challenge lies in attracting, retaining and motivating top caliber faculty and having an attitude in the leadership of the University which is one of responsiveness and sensitivity.

Let me just run over some of my reflections on some of the papers presented.

Bill Monahan's comment about problem solving was an excellent point. He recognizes the University as a reservoir, as a repository for facts and information and data. He says the University must be more—it must be a *problem solver*. I believe the University has the people who can do that. Improved communication

and links and networks are the answer. We certainly are going to work on that idea. A very, very fine point. In particular, the University must do its part in helping solve problems that farmers face economically in the State.

I was impressed with Sam Cole's overview which set the stage. He gave a macro and a cultural statement of the preconditions and the conditions for successful innovation. We must keep these in mind as innovations are of all kinds —sometimes they're managerial, sometimes admininstrative—many kinds in this State. They involve all disciplines. A certain kind of culture and climate is required for successful innovation. Sam gave a fine overview of what the backdrop for that should be.

Several speakers stressed the *inter-disciplinary approach*. Problems don't come in terms of a single discipline. Real world problems more often than not require a number of skills and approaches, simultaneously, in order to arrive at a workable solution. That's the inter-disciplinary approach.The University has a problem with inter-disciplinary approaches. The University is organized by departments, by compartments and by disciplines. It seems the rule often is never the twain shall meet. We have to figure out how to get people promoted and rewarded when they do cross those lines and not penalize them for doing it. This is the only way we're going to be able to help solve problems—by getting people together in an inter-disciplinary approach. We're committed to that. We have to think hard about how to accomplish this need.

Brian St. John spoke about the Cambridge University examples in getting out into the field. The assumption is that faculty members are professional and that they are going to meet their teaching and research responsibilities first and foremost. Then, if they have an opportunity to work on the outside with industry, they're going to be tested in the marketplace--tested because people are paying them. As a result these faculty are able to bring back that real world of relevance into their own research and their own teaching and everyone will benefit in a synergistic way. One of the recommendations made this morning was: Let's get the State to say it's alright for professors to work with business on some basis.

John Cantlon pointed out that if we are going to have autonomy, we don't need the State to tell us to do it. It's our business to do that already.

In my opinion, the biggest problem is not going to be with the legislature or with business. It's going to be right on our own campuses. We have a number of people who believe in the purity of the disciplines, exhibiting an attitude that one should not become a Philistine and associate with some of the people on the outside. This is an attitude that has to be overcome, being careful not to overdo anything. We perhaps are out of balance in many segments of our University.

Some of the greatest breakthroughs in applied research don't come from universities. Over the last 20 years at the high tech level most of the major breakthroughs have come from industry. They haven't come from the university. We have local expertise here on Maui. We have to re-establish links and networks so we can take full advantage of the local expertise that we have here. Guest

lecturers from industry are an approach. Community colleges do this extremely well. Even in the research realm, guest lectures serving on dissertation committees or joint development of curriculum are ways to use local expertise.

Doug MacCleur talked about the closing of the Pineapple Research Institute in '75 and said, "Doggone it, we need someone to do some of that basic research for us again." We have such strength at the University in micro-biology and bio-technology. It's not all in one place. It's all over. We have people in oceanography; we have people in astronomy. We have people in agriculture and marine sciences who are strong in bio-technology and micro-biology who could be brought to bear.

Tom Mailhiot talked about losing jobs to mainland people. There are people here who have to leave the island to get a job and yet there are industries that are hiring people from the mainland to fill jobs here. Why can't we match these up? The Governor is very interested in that. He talked to me about that just last week and I discussed the problem with Dean Chuck Gee the next day. This is a real point, something we need to give serious thought to.

It was highlighted by Lynn Britton when she mentioned that 70 percent of the people of this island are in tourism or tourism-related industry. This brings up two points. First, we really have to go about refining our strength in tourism, keeping it vital, keeping it viable, because so many people depend on it. At the same time, however, we have a lot of eggs in one basket. So at the same time that we work at keeping it strong, we have to be actively exploring alternatives so we won't be at risk.

Tourism supports much of small business in Maui. Lynn indicated that 50 percent of the new jobs created in the country are created by small businesses with less than 20 employees and that 50 percent of the firms fail within the first four years. With 3,500 businesses—typically small businesses—in Maui, there's a lesson in these statistics. Perhaps the University can help in changing these numbers for Maui.

Wayne Hedani's paper was right on target. He outlined the purpose and mission of higher education. He stated that higher education should prepare people to focus on new directions, to stretch for new horizons. This is something that we should keep in mind at all times. We don't want to forget that. The notion that action must follow the rhetoric and not stop with the rhetoric is a most valid point and a recurring theme in the recommendations that have come forward.

In encouraging faculty to work closely with industry as urged by Brian St. John there are obstacles that can be and must be overcome. They are real. There is the question of competing with industry. While we're talking about the University helping industry, there's the real danger that some other people who aren't beneficiaries might see some competition in that. In regard to the conflict of interest problem, the fundamental mission of the University is to hire people who will do teaching and research. We have to be sure that in the process of supporting high tech development and economic development that we don't put people in conflict with that mission.

The idea of encouraging the faculty to work with industry is something that has to come from the leadership of the University. Some faculty are naturally inclined that way and many are disinclined. For those that are so inclined we have to build up support structures for them.

In the future, I believe you will see a University that will more clearly communicate its commitment to being responsive and to being supportive of economic development in the communities around it. You may even find a University which takes the initiative once in a while and maybe even becomes entrepreneurial. I would hope that this University would have those characteristics in the years ahead. This Conference has actually spurred that kind of thinking. This cry and call - almost, plea - for meaningful University involvement and a meaningful and substantive role for the University in economic development is very consistent with the land-grant university. It is also very consistent with our Strategic Plan and is explicitly stated there.

The legistlature has made it very clear, particularly in this last session, that it wishes the University to play a stronger role.

In the recommendations of the discussion groups, the formation of some committees or other vehicles have been called for. One approach that comes to me right now, which may need some more thought, is forming an Action Committee made up of key and highly placed University representatives (perhaps, the Chancellor of the Community Colleges), the community leadership of Maui, along with the key leadership from the Maui Economic Development Board. I would ask Don to identify some of those people for us. It should be a key committee that would look at the recommendations of this Conference and would carry them forward; a committee in which the people who are assigned to it from the University would understand it was a significant and a meaningful commitment of their time and effort, and that we would be looking towards results.

I would like to think that also in the future we would continue to have the kind of attitude and philosophy that I'm trying to express now. The fact that 50 percent of the people here are from the University reflects that we are interested and committed. We do want to have open lines of communication at all University levels and will work towards that in the future. We shall look forward to seeing the write-up of the papers and reports to aid this process.

I would like to also point out to those of you who called for a real partnership between the University and business that the critical role that state government plays should not be overlooked. At some point, that partnership to be successful must include an active and a supportive state government. Speaking to Senator Gerald Machida, who has been with us throughout the meeting, leads me to suggest that a charge from the legislature to *"do something"* would be a good initial step. Let business and the University do something together, and when we need the State's help we'll call for it. Have the partnership develop that way.

My very last statement is to ask you to applaud the concept of this Conference, the

vision that's been shown in this Conference, the implementation of the basic tenets of this Conference, and the results that will follow. The University is very appreciative for the opportunity given to its faculty and staff here on Maui these last two days.

**Donald G. Malcolm**
**President, Maui Economic Development Board**

Thank you, Al, I believe you have summed things up well. All of us have a great and special respect for the university we came from, and we credit it with very high ideals, omniscience and caring. That's why we call it *alma mater*. We also tend to transfer that affection to the university that's nearest us wherever we are, wherever we have been, as a surrogate for our own alma mater.

In the business community, most of us strongly feel that we are like sons and daughters that have left home and who occasionally come back, want to talk to our folks, get some encouragement and perhaps some respect or recognition for what we are trying to accomplish. Often we may seek some help. Similarly, we want to talk to this alma mater near at hand every now and then and say, "There are some things you can do that will help us, help our industry. Here's what we're trying to do. We are probably not very well organized in presenting our problems, but we'd like to sit down and talk things over and see if we can't arrive at some new thoughts and develop some areas wherein you might be more helpful to what we are trying to do using your graduates. Also you may be able to straighten us out in areas where we are trying to move a little too fast or a little too far."

That's what we've been up to the last two days. We've learned a lot about the dimensions of the partnership that's required and the challege our society is facing with the current technological explosion occurring in the world and in our business community. We are now in a second wave relative to the use of research and technology. After World War II tremendous activity was put into research and development as an institution. Universities were central to this first wave. Now with the advent of the information age we are seeing the second wave or explosion wherein new knowledge, products and industries are created at even a more rapid rate. The traditional relations between universities and the business community have become obsolete. Universities are no longer the central driving force. Time has become compressed and both communities and states have to be more competitive to provide meaningful jobs.

In most parts of the country new types and kinds of partnerships between business and the academy have been or are being developed to meet this challenge. I was impressed with the models presented - Washington State University, Michigan State University, the community colleges in Wisconsin and California, for instance . These partnerships have been developed recognizing the need for business/academic interaction and ventures in pursuing useful mutual goals in the application of new technology. These represent models to seriously examine and emulate in terms of policy, investment, and communication.

We also learned that more of the *applied research* in the United States is being performed in private organizations and that specialization in particular areas is creating a new type of company - *the applied research company.* These are the areas wherein new jobs are being created. Colonel Carter indicated, for example, that more than 50 percent of Defense Department research is now being performed by such private sector firms and that the trend is for even more. These companies are a new "player" in the game that must be considered by the university and the business community.

So we are finding that a lot of new things are happening in the private sector that formerly often were considered as research functions of universities and their domain. The university now must have closer ties with such companies to enable their own research to be relevant and to develop jobs in their own state. This is a compelling argument for the research and technology parks which we have heard described. Such a capability in Hawaii is vital to our long range economic diversity and viability.

We are also finding that there are other new players in the game. We now have something that I doubt that very many of us heard of a few years ago, *venture capitalists.* We probably don't really appreciate what a venture capitalist is, that it is a very major source of funding for ventures involving the application of new technology.

Hawaii hasn't made much use of venture capitalists for a variety of reasons. However, this is a capability that we will find will be very necessary and will be a common word a few years from now. It takes *capital*—new venture capital—to create new businesses. Capital will have to be imported in the main. Brian St. John has given us good advice as to how venture capitalists view investment situations. The role of the university and its capabilities, policies and plans relative to the needs of new business ventures are significant factors in determining the feasibility of potential investments in new or expanding businesses.

Another new player is the *developer.* In Hawaii, we don't think of a developer in the same context as on the mainland relative to the research and technology field. Here, we've thought of a developer as primarily the financiers and as developers of resort complexes, and not as the driving force in bringing in new businesses. We must change that perspective and view developers as a major avenue for attracting new business to the state.

I submit to you that our economy of the future here will depend on some infusion of capital, that capital will be important to making these desired things happen. To do this we will find that the University and the business community will have to deal with new forms of partnerships. This will require new institutions or other organizations to be developed by the University in order to be competitive in todays competitive world regarding R & T.

Many of the suggestions that we have heard from the discussion panels today recognize those themes, and indeed they have been central to their recommendations. We should strive hard to implement these suggestions and stand

ready to help out in their implementation.

We also learned that Maui has several natural advantages and opportunities to explore and that we should work together in developing action programs to realize their potential. These will be followed up.

To me, a message the business community has been delivering to the University is that it would be most helpful to (1) develop new institutes—or whatever they end up being called—that can help unleash and encourage some of the tremendous talent contained in the University to be more pro-active in our business community; (2) to develop new policies to help release that energy and capability, to motivate it, and to keep it in the University so that it can be an aggressive and positive influence in making business in Hawaii more diverse and productive.

We hope we have coalesced some of the views of our business community into a more understandable message. We are most thankful to the University for allowing us this forum.

In the discussion groups' recommendations are the beginnings of a vigorous partnership and several promising ideas to pursue immediately. We stand ready to work with the University in pursuing these recommendations. Our aim consistently has been to work with the University cooperatively and within the established system of decision-making in the State.

We look forward to this rewarding task. We are most pleased with the reception to the concepts proffered, to the attitudes and enthusiasm of everyone here. A meaningful dialogue has been started, or perhaps more appropriately stated, enhanced

**Colin Cameron**
**Chairman, Maui Economic Development Board**

I have been greatly impressed by everything that has occurred all day yesterday, and this morning in particular. I have very much the same feeling as I did after the Kapalua Conference we had four years ago—in fact—even more so!

I think the approach in compressing the time for each speaker made the people think even faster and work even harder. It has been a wonderful example of cooperation between the academic sector, the University, Community College, and the private community.

I'm very excited about what we can do and what has been recommended. We certainly pledge the cooperation of the Maui Economic Development Board and the business community of Maui, in every possible way. We thank you again deeply for your participaton.

*Appendix*

## REPORT OF SYMPOSIUM GOLF TOURNAMENT

**Dr. Glenn Miyataki, Director**
**Long Range Planning**
**University of Hawaii**

To top off the Kapalua "Symposium/Workshop on the Business/Academic Partnership," thirteen golf duffers teed it up for the jackpot prize of pride and recognition. Four hours later, after some grueling shot-making and constant harrassment, Dan Shigeta (the UH Manoa College of Tropical Agriculture and Human Resources administrator based on Maui) emerged victorious. One shot back in a tie for second was the dynamic Maui duo of Pundy Yokouchi, community and business leader, and Senator Gerald Machida.

Also-rans were Paul Yuen, Dean of the College of Engineering, UH Manoa; Pat Takahashi, Executive Director of the Hawaii Natural Energy Institute, UH Manoa; Ed Yuen, Director of Procurement and Property Management, UH system; Larry Sakima, Director of Contracts and Grants, UH system; Ralph Horii, Director of Finance, UH system; Ralph Miwa, Chancellor, UH-Hilo and West Oahu College; Youngki Hahn, Business Economics Professor, UH-Hilo; Steve Kameda, administrator from Maui Community College; Ken Kato, UH Regent and business leader from Maui; and Glenn Miyataki, Director of Long Range Planning, UH system.

One of the highlights of the day's play was a torrid match between Youngki Hahn and Ralph Miwa of UH-Hilo and Ken Kato and Gerald Machida representing Maui. At the 17th hole, the Mauians overwhelmed UH-Hilo for a resounding victory. It was all in a day's work, and the conference ended for the golf participants with a lot of goodwill, new-found friends, and a good start toward a lasting partnership.

BLACK FOLDERS Discussion Group 2,3 May 1985

THE POTENTIAL, FEASIBILITY, and APPROACH to DEVELOPING a STRONG PRIVATE SECTOR R & T CAPABILITY on MAUI

SOME SUGGESTED QUESTIONS FOR DISCUSSION

1. What is the proper organization and role for a Business/Academic Partnership in support of the Maui R & T Park initiative ?

2. How should it be developed?
   University Actions? Business Actions?

3. What are the principal ways in which Academic Institutions ASSIST in developing private sector R & T? In which they IMPEDE?

4. What are the existing policies of the University that would apply to the formation and operation of such a Partnership?

5. Do these policies enable or constrain the development of a partnership?

6. What new policies, long term changes/developments will be needed? Short Term?

7. How can these changes be accomplished?

8. RECOMMENDATIONS relative to structure, approach and responsibilities of such a venture?

9. RECOMMENDATIONS for ACTION relative establishing a Business/Academic Partnership or some other appropriate approach?

   At State Level? University? DOE? Business Community?

## GENERAL CONSIDERATIONS

**University Mechanisms for Supporting Research on Maui**

- [] Is Hawaii competitive in its policies relative to University Research?
- [] The role and need for entrepreneuring in research activities?
- [] Are new mechanisms or "institutes" needed?
- [] Ideas for New Institutes and/or funding approaches?
- [] Would external advisory committtees on research projects of major size be useful?

**Graduate Programs on Maui**

- [] Can research programs such as NifTAL be used as a basis for starting relevant new academic programs? Would this aid in better integrating researchers into the University?
- [] Can graduate programs and/or upper division programs such as Finance, TIM, etc., be conducted in total or in part on Maui?

**Is There Need for a Decentralization Policy by the University?**

- [] The utility of the cost-effectiveness approach in evaluating alternatives. Potential impact on strategic planning.
- [] Can the University assist the State by becoming an instrument of population decentralization? The University could assist by:
  - () Direct means--Planned decentralization of some programs
  - () Indirect means-- Encouraging research connections and activities on Neighbor Islands.

**A Look at the University's Strategic Planning Process and Plan on Maui**

- [] Are the University's planning and delivery systems designed so as to be reflective and responsive to Maui's needs?
- [] Does the Maui Community have adequate access to Manoa programs?
- [] How best to keep the planning process from becoming an inhibitor to innovation and needed change?
- [] How to encourage local business to invest in a community college? Access policies relative to equipment gifts?
- [] The emerging role of community colleges with high tech industries

**Developing New Mechanisms to Relate with the Business Community**

- [] New business technology dissemination--applied operations research
- [] The role of communications in University, community college relations with the business community. Can two-way teleconferencing on Maui be developed with business participation? Maui, as an island county in an island state is in an unique and challenging position for some major applications research to be done. Could this be a model program?
- [] Assessment of high tech educational expectations.

**Maui as a Model for Involving Business (and Local Government) in Program Development and Facility Planning**

- [] High tech cooperative development programs
- [] Is there a need for a standing advisory committee to the University re the business sector of the Neighbor Islands?
- [] Can research partnerships with private sector companies be utilized?
- [] Developing relationships with secondary schools and providing feedback concerning educational requirements for jobs of the future.

ORANGE FOLDERS Discussion Group 2,3 May 1985

THE POTENTIAL, FEASIBILITY, and APPROACH to DEVELOPING U.S.DEPARTMENT of DEFENSE R & T CAPABILITY on MAUI

SOME SUGGESTED QUESTIONS FOR DISCUSSION

1. What are the desired kinds of Defense sponsored research activity? What kinds of organizations are currently used?

2. Define the Research areas that might be appropriate for Maui? Requisite skills etc.

3. What is the possibility of a Private Sector/Academic Partnership in connection with such an activity? Is a totally private sector activity preferred in current Defense contracting practices?

4. What are the existing policies of the University that would apply to the formation and operation of such a Partnership?

5. Do these policies enable or constrain the development of a partnership?

6. What new policies, long term changes/developments will be needed? Short Term?

7. How can these changes be accomplished?

8. RECOMMENDATIONS relative to structure, approach and responsibilities of such a venture?

9. RECOMMENDATIONS for ACTION relative establishing a Business/Academic Partnership or some other appropriate approach?

   At State Level? University? DOE? Business Community?

GREY FOLDERS Discussion Group 2,3 May 1985

DEFINING a ROLE for MAUI in INTERNATIONAL ECONOMIC DEVELOPMENT, R & T and TECNOLGICAL TRANSFER ACTIVITIES

SOME SUGGESTED QUESTIONS FOR DISCUSSION

1. To what Rolewn Maui aspire in regard to International Economic Development?

2. Can Maui become an International Technological Transfer Point?
   What are the activities in such an activity?
   What capabilities are Required? Personal skills? Technological?
   What is the role for the Business/Academic Partnership?

3. Critique of a Concept for an International Center on Maui. To be presented.

4. RECOMMENDATIONS relative to structure, approach and responsibilities of such a venture?

5. RECOMMENDATIONS for ACTION relative establishing a Business/Academic Partnership or some other appropriate approach?

   At State Level? University? DOE? Business Community? Other?

GREEN FOLDERS Discussion Group 2,3 May 1985

THE POTENTIAL, FEASIBILITY, and APPROACH to DEVELOPING an INTERNATIONAL CENTER For AGRICULTURAL RESEARCH, TRAINING, and TECHNOLOGICAL TRANSFER on MAUI

SOME SUGGESTED QUESTIONS FOR DISCUSSION

1. What is the proper organization and role for a Business/Academic Partnership relative to Agricultural Research, Training,and Technological Transfer on Maui?

2. What should the emphasis be? e.g Subjects? Biotech?
   Does agriculture offer special opportunities for partnership that may not exist in other fields?

3. What are the principal ways in which Academic Institutions ASSIST in developing private sector R & T? In which they IMPEDE?

4. What are the existing policies of the University that would apply to the formation and operation of such a Partnership?

5. Do these policies enable or constrain the development of a partnership?

6. What new policies, long term changes/developments will be needed? Short Term?

7. How can these changes be accomplished?

8. RECOMMENDATIONS relative to structure, approach and responsibilities of such a venture?

9. RECOMMENDATIONS for ACTION relative establishing a Business/Academic Partnership or some other appropriate approach?

   At State Level? University? DOE? Business Community?

**Symposium/Workshop**
**on**
**The Business/Academic Partnership**
**in the Economic Development of Maui**

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